

SPECIAL PROVISIONS

SP-1 SPECIFICATIONS AND CONTRACT DOCUMENTS

The Bidding Requirements, Contract Forms, Conditions of the Contract, Standard General Conditions, and Specifications governing this contract are the Montana Public Works Standard Specifications (MPWSS), Sixth Edition, April 2010.

SP-2 GENERAL

The following special provision items are included to supplement the standard specifications and to clarify items specific to this contract. These provisions are part of the overall specifications and, as such, shall be regarded in a like manner during the bidding process and during the construction phase. The special provision items shall govern during the construction phase and shall supersede items of like nature in the standard specifications. Precedence shall be given in the following order: 1) Special Provisions; 2) Technical Specifications; 3) Montana Public Works Standard Specifications (MPWSS), Sixth Edition, April 2010.

Contractor shall coordinate all construction activities through all phases of the project, the intent being to complete the proposed construction in a neat orderly fashion, in a timely manner, and with a minimum of disturbance to neighbors and the traveling public.

The Contract Drawings consist of 26 sheets. Each sheet bears the following general title: Cooney State Park Expansion of Existing Red Lodge Campground.

Contractor shall construct project only using plan sheets marked “Issued for Construction”.

SP-3 PROJECT DESCRIPTION

This project consists of the expansion of the existing Red Lodge Campground at Cooney State Park to include: a new loop roadway, extension of the existing loop roadway, new campsites, a new camp host site, latrines, utilities and landscaping.

Additive Alternate No. 1 consists of additional landscaping and irrigation system components over what it is included in the base bid.

SP-4 SCHEDULING

Prior to or at the Preconstruction Conference, the Contractor shall provide the Engineer/Owner with a practicable Construction Progress Schedule showing the order, timing, and progress in which the Contractor proposes to complete the work.

This schedule shall be in bar graph, CMP, or PERT format. The schedule shall be updated and resubmitted with each application for payment requested.

SP-5 PAYMENT AND PERFORMANCE BONDS

Payment and Performance Bonds are required in accordance with Montana Public Works Standard Specifications (MPWSS), Sixth Edition, April 2010. Bond forms have been provided in the Payment and Performance Bonds section of the Contract Documents.

SP-6 CERTIFICATE OF INSURANCE

Insurance coverage shall be in accordance to with Montana Public Works Standard Specifications (MPWSS), Sixth Edition, April 2010.

SP-7 PREVAILING WAGE RATES

All work performed under this contract shall be subject to the Montana Prevailing Wage Rates. For the Contractor's reference the wage rates have been included with Contract Documents.

Contractor shall maintain payroll records in a manner readily capable of being certified for submission under MCA 18-2-423, for not less than 3 years after the Contractor's completion of work on the project.

SP-8 PAYMENT OF CHANGE ORDERS

Additional work, above and beyond the original contract work will not be paid for without a signed change order or contract amendment signed by the Owner prior to the start of any work. The one exception will be in the event verbal approval for a change order is granted by the Owner, a letter stating the same must be signed by the Owner prior to start of any work.

Any work that has begun prior to obtaining approval from the Owner or the exception listed above will not be paid for by the Owner and will not be added to the contract.

A reconciling change order showing final in-place quantity over-runs and under-runs will be prepared before the final payment to the Contractor. The unit prices will remain unchanged. This reconciling change order shall be prepared before authorization of final payment to the Contractor.

SP-9**ADVERSE WEATHER SHUTDOWN**

The Contractor is advised that should the Contractor request an adverse weather shutdown and should such a shutdown be approved by the Engineer/Owner, all work on the project shall cease. The Engineer will not be available for work inspection during such shutdowns and any work completed by the Contractor during such a shutdown will not be accepted by the Engineer.

In no case will an adverse weather shutdown be approved by the Engineer until all temporary services have been restored.

During adverse weather shutdown, Contractor must maintain storm water management facilities in accordance to the Storm Water Management and Erosion Control Permit, (in accordance to Montana Department of Environmental Quality), and maintain all temporary roads and walkways.

SP-10**BASIS OF PAYMENT**

The bid items included in the Bid Form include all items, which will receive payment under this contract. Additional work described in the Contract Documents or shown on the Plans, which is not specifically listed in the Bid Form, shall be considered incidental to the closest associated Bid Item.

The basis for payment shall be as abbreviated on the Bid Form and defined below:

LS	=	Lump Sum
EA	=	Each
LF	=	Linear Feet
VF	=	Vertical Feet
CY	=	Cubic Yard
SY	=	Square Yard
SF	=	Square Feet
TN	=	Ton
GL	=	Gallon

At project completion, adjustments to quantities will be made based on actual amounts installed. Adjustments will not be made for Lump Sum items unless the scope of work is substantially changed during construction as determined by the Engineer. The Engineer shall have final authority in determining if the scope of work has substantially changed. If scope of work must be changed due to negligence or fault of the Contractor, additional payment for Lump Sum items shall not be made. Quantity adjustments to all non-lump sum items shall be measured by the Engineer in the presence of the Contractor. Payment for each item shall be for the finished product including all labor, materials, equipment, overhead, profit and any other miscellaneous items unless otherwise noted in the Contract Documents.

Mobilization and Insurance Bid Items. These items include the mobilization of equipment to the site, insurance and bond costs and demobilization. Payment for Mobilization and Insurance Bid Items shall be made as follows. Sixty (60) percent of the total item shall be paid with the first application for payment. The remaining forty (40) percent of the total shall be paid with the first application for payment that is submitted to the Engineer after the Certificate of Substantial Completion has been signed by the Engineer and the Owner.

Partial Payments of Lump Sum Bid Items. Payment for all lump sum items shall be made on the basis of percent of work complete on individual items at the time the Contractor submits the Application for Payment to the Engineer. If required by the Engineer, the Contractor shall provide evidence of percent of work complete. The percent of work shall then be determined by the judgment and calculations of the Engineer.

SP-11 ***LIMITS OF CONSTRUCTION***

The Contractor is required to confine construction activities within the limit of the Red Lodge Campground.

Open space, vacant lots, or undeveloped land shall not be considered for Contractor use unless the Contractor obtains separate temporary easements. Said separate temporary easements shall be in writing executed by the property owner of said land and an executed copy shall be filed with the Owner and the Engineer, prior to Contractor occupancy of land.

Unless specifically designated for removal, all trees and other improvements in or adjacent to easements and rights-of-way shall not be touched, trimmed or injured. All restoration outside the limits of the construction areas shall be at the Contractor's expense.

SP-12 ***STAGING AREA***

The staging area for this project shall be located toward the south side of the campground area, away from all existing campground facilities.

SP-13 ***CONSTRUCTION ACCESS***

The Contractor may access the site via the main campground entrance road, but should limit the number of trips through the existing loop roadway. The Contractor shall provide temporary gravel construction access as required, but shall restore the site to its original condition. Any damage to existing roadways or existing campground areas will be repaired at the Contractor's expense.

SP-14***PRESERVATION AND REPAIR BY CONTRACTOR***

The Contractor shall be responsible for the preservation of existing paved and gravel street sections which are not to be disturbed by construction. The Contractor is hereby cautioned that any damage done in any paved or gravel service road, due to any construction or travel operations (hauling, storage, unloading, etc.), shall be repaired and/or replaced at Contractor's expense, and to the satisfaction of the Owner. The Contractor shall familiarize themselves with the existing sections in the area and consider self-imposed load restrictions conforming to those sections. All access roads shall be kept free and clear of all mud, gravel, debris, etc., during the project. There will be no additional payment to the Contractor for the cleaning and sweeping of all access roads.

SP-15***CONTRACTOR'S SUPERINTENDENT***

The Contractor will be required to have a full-time resident General Superintendent on the project at all times while the work is in progress. The General Superintendent shall be knowledgeable and qualified to evaluate the quality of not only the general construction work but especially the systems and installations of subcontract work.

The General Superintendent shall:

- Aggressively evaluate on a day-to-day basis and be responsible for the quality and acceptability of all work.
- Make the first determination as to the fitness and compliance of all work performed.
- Be the initiator in regard to rejection of unfit work.
- Not passively default or abdicate, in the first analysis, these duties to the Architect/Engineer or to the Owner.

The General Superintendent shall be in a position to direct the work and make decisions either directly or through immediate contact with General Superintendent's superior. Absence or incompetence of the General Superintendent shall be reason for the Owner to stop all work on the project.

The General Superintendent or Contractor's designated representative shall maintain, at the project site, a "Record Set of Drawings" showing field changes, as-built elevations, unusual conditions encountered during construction, manufacturer's catalog number of equipment supplied, and other data as required to provide the Owner with an accurate "as-constructed" set of Drawings. An approval by the Engineer shall not be given on the final payment request until complete record drawings are submitted to the Engineer.

SP-16 ***CONTRACTOR WORK HOURS***

The schedule for this project has been figured on the basis of the Contractor working five days a week (Monday through Friday, excluding legal holidays), eight (8) hours a day. Should the Contractor and/or Contractor's subcontractor(s) desire to work more than five (5) days per week or more than eight (8) hours per day, then approval to do so must be obtained from the Engineer/Owner. If the additional work hours result in costs above and beyond the Engineer's contract fees, the actual cost of the additional Engineer's services will be the responsibility of the Contractor and will be deducted from the Contractor's application for payment. These costs shall not be considered a part of the liquidated damages.

No work shall be done between the hours of 6:00 p.m. and 8:00 a.m., nor on Saturdays, Sundays, or legal holidays, without the written approval of the Owner. However, work necessary in case of emergencies or for the protection of equipment or finished work may be done without the Owner's approval.

SP-17 ***CONTRACTOR RESPONSIBILITIES***

The Contractor shall be responsible for obtaining all permits as required by local government agencies.

The Contractor shall enforce strict discipline and good order among Contractor's employees and other persons carrying out the Agreement. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them. The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on performance of the work.

The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Agreement. At completion of this work, the Contractor shall remove from and about the project waste materials, rubbish, tools, construction equipment, machinery and surplus materials.

To the fullest extent of the Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer from and against all claims, costs, damages, losses and expenses, including, but not limited to, attorney's fees arising out of or resulting from performance of the work caused in whole or in part by negligent acts or omissions of the Contractor, subcontractor(s), anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder.

The Contractor shall coordinate all phases of the work with Owner's use of the site to minimize or avoid conflict, protect all existing work adjacent to new construction, and repair any damage and leave premises in original condition, except where otherwise specified by the Engineer. Contractor agrees to attend or be represented at weekly team meetings during the term of the project to assure coordination with the other project participants.

SP-18 WATERWAY AND DITCH CROSSINGS

The Contractor shall schedule Contractor's work to prevent interruptions of local irrigation operations and waterways. All ditches and waterways are to be restored to the satisfaction of the user(s).

SP-19 GROUNDWATER CONSIDERATION

The Contractor is advised that groundwater *may* be present at the project site. The Contractor is responsible for providing dewatering equipment and methods for this project. Groundwater shall be removed from the open trench area to satisfactorily prevent the rising of water into the new or any existing piping that may be exposed during the work.

The Contractor shall be responsible for arrangements of permits and obtaining of sites of groundwater discharge or flushing discharge. This shall include all cleanup, restoration, etc., of any discharge areas. No claims for any of the above-related work shall be submitted to the Owner.

Control of groundwater shall be accomplished in a manner that will preserve the strength of the adjacent structures foundation soils; will not cause instability of the excavation slopes; and will not result in damage to existing structures. Damage caused to adjacent structures or wells shall be repaired at the Contractor's expense. Temporary water shall be provided for wells that are reduced in capacity as a result of dewatering at the Contractor's expense.

SP-20 TEMPORARY FACILITIES

Water, power, heat, and toilet facilities are not available at the job site. The Contractor shall provide, at Contractor's expense, temporary water, power, heat, and toilet facilities, as required.

The Contractor shall design, construct, and maintain miscellaneous services and facilities as needed to accommodate performance of the work, including temporary stairs, ramps, ladders, staging, shoring, scaffolding, temporary partitions, waste chutes, sidewalk bridge/walkway, and similar items.

SP-21 UNCLASSIFIED EXCAVATION AND TOPSOIL

The cross-sections and associated quantities included within the plans are based upon existing ground to subgrade cuts.

Payment for excavation of the calculated quantity for stripping and stockpiling of the topsoil will be paid under the associated bid item.

SP-22 SITE GRADING

Excess material generated from roadway excavation will be distributed throughout the site as directed by the Engineer/Owner. Excess material shall be graded and blended into the surrounding topography to provide a natural appearance to the finished grade of the project. The placement and grading of this material shall be considered incidental to the unclassified excavation bid item.

SP-23 DUST CONTROL

The Contractor shall provide dust abatement for all roads and work areas and prevent dust from becoming a nuisance to campground users or adjacent properties. There will be no payment for dust control as a separate bid item and this work is considered incidental and at the Contractor's expense.

SP-24 WATER FOR CONSTRUCTION PURPOSES

Construction water required for compaction of embankments, subgrade, trenches, gravel courses, paving, or any other construction related work must be supplied by the Contractor at Contractor's expense.

SP-25 PRIVATE UTILITY COORDINATION

The Contractor will need to coordinate operations with Beartooth Electric Co-op and possibly other private utility companies (i.e., Montana-Dakota Utilities Company, Northwestern Energy, Bresnan Communications, Qwest Communications and other utility owners) for the moving, crossing, support or reinstallation of services, poles, and mainlines and their appurtenances.

SP-26 UNDERGROUND UTILITY CROSSINGS

The Contractor shall be responsible for checking with the owners of the underground utilities such as the power, gas, and telephone companies, etc., as to the location of their underground installations in the project area. The Contractor shall be solely responsible for any damage done to these installations due to failure to locate them or to properly protect them when their location is known.

It shall be solely the responsibility of the Contractor to fully coordinate Contractor's work with the agencies and to keep them informed of Contractor's construction activities so that these vital installations are fully protected at all times.

A Montana One-Call system (1-800-424-5555) has been established to facilitate requests for underground facility location information. The Contractor is cautioned that all utilities may not be on this system.

Type 1 Bedding Material and Type A Trench Backfill shall be utilized to replace material under and around such municipal and private utility lines. Compaction above the bedding material and under the utility line crossing is critical and must be maintained. No separate measurement and payment shall be made for this item. All costs shall be considered an integral part of and be included in the price bid for pipe complete-in-place.

The relocating, bracing, raising or supporting of facilities as required by this construction will be the responsibility of the Contractor. The Contractor shall schedule Contractor's operations and establish such coordination with the respective owners as necessary so that any conflicts are avoided.

The Contractor shall have full agreement and understanding with the affected utility companies on what the existing conditions are and what will be necessary to be changed for the Contractor's construction. The Contractor will obtain any permits, agreements, or insurance required. No separate measurement and payment shall be made for this item, unless specifically noted. All costs shall be considered an integral part of and be included in the price bid for pipe complete-in-place.

SP-27 SIGNS, SIGN POSTS AND UTILITY POLES

All existing signs, sign posts and utility poles determined to be in the path of the work zone shall be temporarily removed and later replaced in their previous location. The conditions of MPWSS Section 02114 shall apply to this section with the exception that there shall be no separate measurement and payment for this item.

SP-28 SECURING WORK AREAS AND PEDESTRIAN TRAFFIC

The Contractor is reminded of the importance of securing all work areas during and after construction work hours to prevent pedestrian access. Costs associated shall be included in related bid items.

SP-29 TRAFFIC SIGNING

Traffic signing shall comply with the Montana Public Works Standard Specifications, Sixth Edition, the Manual on Uniform Traffic Control Devices, and as detailed on the plans.

SP-30 *TRAFFIC CONTROL*

The Contractor will be required to prepare and submit traffic control plans for review by the Engineer and approval by the Owner.

Temporary traffic signing shall comply with the Manual on Uniform Traffic Control Devices, and as detailed on the plans.

If during the course of work, additional signing is deemed necessary by the Contractor, the Contractor shall submit a written request to the Engineer for approval by the Owner. If the additional signing results in extra expenses, then the extra expenses shall be compensated through a change order to the contract and shall be executed in accordance with all references and requirements herein. No traffic control signs shall be placed on existing sign or utility poles, during construction.

SP-31 *CONSTRUCTION STAKING*

The Contractor is responsible for providing construction staking for measurements, lines, locations and grades necessary for construction. All construction staking shall be performed under the responsible charge of a land surveyor licensed in the State of Montana and by a party chief or engineering technician experienced in construction layout and staking techniques as are required by the specific type of work being performed.

1. Grade stakes or slope stakes for excavation and fill.
2. Subgrade bluetops.
3. Base gravel bluetops.
4. Off-sets for utilities.

Payment for construction staking shall be considered incidental to the work and is to be covered under other bid items of the project.

SP-32 *WATER MAIN DISINFECTION WATER DISCHARGE*

State permits may be required for dechlorination and discharge of chlorinated disinfection water. Said permits and associated fees shall be responsibility of Contractor.

All temporary water systems, if required, shall have the same disinfection and testing as mainlines.

SP-33 *GEOTECHNICAL ENGINEERING REPORT*

A geotechnical investigation and report has been completed for this project. For the Contractor's reference only, the entire report has been included with Contract Documents.

SP-34 COMPACTION REQUIREMENTS

All roadway work shall be compacted to 95 percent of maximum dry density as determined by the standard proctor method ASTM (D-698). Compaction requirements for areas under roadways shall be in accordance with MPWSS Section 02230.

SP-35 STORM WATER MANAGEMENT AND EROSION CONTROL

The Contractor(s) shall make note that this project is subject to Montana Department of Environmental Quality Storm Water General Discharge Permit authorization. The Contractor shall pay the application fee, the first annual fee, and additional annual fees necessary until the termination of the permit has been granted by the Montana Department of Environmental Quality (MDEQ). The Contractor is responsible for securing and administering the permit and installation and maintenance of the erosion control structures, which will be paid under the Storm Water Management and Erosion Control Bid Item. All Storm Water Management and Erosion Control for this project shall comply with the requirements set forth in the General Permit for Storm Water Discharges Associated with Construction Activity which can be obtained from MDEQ at:

<http://www.deq.state.mt.us/nqinfo/MPDES/StormwaterConstruction.asp>

The Contractor is required to complete and submit a Notice of Intent (NOI) and a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the requirements stated in the General Permit. The NOI shall be completed with the Contractor as Applicant/Operator. Applicant shall be responsible for achieving final stabilization and submitting the Notice of Termination (NOT).

The construction drawings include an Erosion Control Plan and Erosion Control Details to assist the Contractor in preparation of the required documents for submittal to MDEQ. The Contractor shall review these drawings to determine if modifications are needed to comply with the Storm Water Discharge Permit requirements as they pertain to the Contractor's construction operations. If modifications are required, the Contractor shall submit a redlined copy of the drawings to the Engineer for corrections. The Engineer will then make said corrections and return the drawings to the Contractor for submittal within five (5) working days following receipt of changes.

The Contractor shall comply with all requirements and conditions of the General Permit and the Storm Water Pollution Prevention Plan (SWPPP). Failure to do so

will result in the issuing of an order to suspend work in addition to the potential fines that may be assessed by the Montana Department of Environmental Quality.

The Contractor's responsibilities regarding maintenance of erosion control structures, after final project acceptance, will be limited to the areas disturbed by the utility and street construction for this project only. The Contractor will not be responsible for erosion control beyond the disturbed areas of this project due to adjacent construction. It is the Contractor's responsibility to document the extent of disruption due to construction activities directly related to this project. The documentation should include pictures with a date stamp that is concurrent with the date of final project acceptance.

SP-36

MATERIALS TESTING AND CONTROL

A. The following materials and control tests may be made by the Engineer to determine the Contractor's compliance with the specifications:

1. In place density test of subgrade backfill, subbase, and base, independent of any contractor testing required for completion of the work.
2. Gradation, liquid limit and plasticity index tests of subbase, base and surfacing aggregates. Tests of subbase and base course materials shall be made from material in place.
3. Stripping tests, volume swell tests, fracture tests, wear tests, and soundness tests shall be made prior to or during the Contractor's crushing operations.

The periodic tests made by the Engineer, of the Contractor's production may serve as the basis for rejecting completed work or stockpiles as unacceptable. The above tests - paragraphs A.1 through A.3 - shall be made with no cost to the Contractor, except as herein provided for test failure. Should any of these tests fail, the Contractor shall then be responsible for the cost of the failing test. The costs of the failing tests shall be deducted from the Contractor's application for payment.

B. The costs of the following tests shall be paid for by the Contractor:

1. Any additional tests the Contractor requires to control Contractor's crushing, screening or other construction operations.
2. Test failure, as provided above.
4. Any additional tests required to verify acceptable quality of supplied materials. This shall include, but not be limited to, a three-edge bearing test.

- D. Acceptance and rejection of materials will generally be determined from tests made of the various courses complete and in-place in the field. While the Engineer may, during course of construction, make tests at the source or point of production; it is the responsibility of the Contractor to conduct, control and test Contractor's production operations in such a manner that the materials produced will meet the specification requirements.

Contractor shall be responsible for all quality control testing. Owner shall be responsible for quality assurance testing.

SP-37 TECHNICAL SPECIFICATIONS

Technical specifications have been included in the Contract Documents and are incorporated by reference. The attached technical specifications shall be considered a part of these Special Provisions in determining precedence of the Contract Documents.

SP-38 SHOP DRAWINGS

Shop drawings shall be submitted for all materials used in the project including, but not limited to the following:

- A. Gravel, base course and pit run materials
- B. Piping and Components
- C. Signage
- D. Trees
- E. Seed and Fertilizer Mix
- F. Irrigation System Components
- G. Concrete Latrine
- H. Concrete, Reinforcement, Anchors
- I. Corrugated Metal Pipe and Appurtenances
- J. Pump House
- K. Pump and Appurtenances
- L. Electrical Panels, Pedestals, Wiring and Appurtenances

SP-39 TYPES OF PIPE

Listed below are the only types of pipe approved for installation for the corresponding type of underground utility.

- | | | |
|------------------------|---|---|
| Gravity Sanitary Sewer | - | Schedule 40 Poly-vinyl chloride pipe |
| Water | - | HDPE SDR 11, as per MPWSS Section 02730 of this specification |
| | - | Schedule 40 or 80 Poly-vinyl chloride pipe, where indicated |

SP-40***UNSUITABLE BACKFILL***

The Contractor is responsible for stabilizing all excavated areas before backfilling. Any excavated material that is unsuitable for backfill, due to moisture content (either excessively wet or dry), shall be conditioned in a manner acceptable to the Engineer to render it suitable for backfill in accordance with Section 02221 of MPWSS, Sixth Edition. All costs associated with this work shall be considered incidental.

If the Contractor chooses not to condition the unsuitable materials, imported material, approved by the Engineer, shall be substituted for backfill. Imported material and disposal of unsuitable materials shall be considered incidental.

SP-41***EXPLANATION OF BID ITEMS***

The following items are intended to clarify the scope of the following Bid Items, but are to be considered supplemental to the rest of the Contract Documents and not necessarily all inclusive of items, which must be completed for payment of each Bid Item.

Bid Item No. 101 – Mobilization and Insurance. This bid item shall include the costs associated with mobilizing equipment to the project site, insurance, bond costs, permitting, submittals, and demobilization. Measurement and payment will be by lump sum (LS). Sixty (60) percent of the total item shall be paid with the first application for payment. The remaining forty (40) percent of the total shall be paid with the first application for payment submitted after the Certificate of Substantial Completion has been signed by the Owner.

Bid Item No. 102 – Stormwater Management and Erosion Control. This bid item shall include all cost associated with securing and administering the permit and installation and maintenance of the erosion control measures in compliance with all requirements and conditions of the General Permit and the Storm Water Pollution Prevention Plan (SWPPP). Measurement and payment will be by lump sum (LS). Partial payment on lump sum items shall be made on the basis of percent of work completed.

Bid Item No. 103 – Strip and Stockpile Topsoil. This bid item shall include removing and stockpiling all topsoil from the site (approximate 6-inch depth per geotechnical report) prior to excavation of all roadways and campsite areas. Topsoil will be replaced throughout the site under Bid Item No. 143 – Place and Finish Grade Topsoil. Measurement and payment for this item will be by the cubic yard (CY).

Bid Item No. 104 – Unclassified Excavation. This bid item shall include the unclassified excavation of all roadways, pedestrian trails, campsite areas, and drainage ditches. It shall include subgrade preparation and placement of excess material throughout the site in a manner approved by the Owner. Measurement and payment for this item will be by the cubic yard (CY).

Bid Item No. 105 – 15-inch CMP Culvert. This bid item shall include the cost of all materials and labor associated with the placement of the culverts, including flared end sections and trash racks secured in place. This includes all necessary excavation, subgrade preparation and compaction of backfill material. Measurement and payment for this item will be by the linear foot (LF).

Bid Item No. 106 – Riprap, $D_{50} = 6$ -inch. This bid item shall include the cost of all materials and labor associated with the placement of riprap at either end of the culverts. Measurement and payment for this item will be by the cubic yard (CY).

Bid Item No. 107 – Road and Campsite Gravel Section (4-inch gravel and 5-inch pit run). This bid item shall include the cost of all materials and labor associated with the placement of the gravel section for all roadways, campsite pull-thrus and parking areas. It shall include the cost of the imported gravel mix, grading, compaction, and associated compaction testing. Measurement and payment for this item will be by the cubic yard (CY).

Bid Item No. 108 – Trail Gravel Section (4-inch gravel). This bid item shall include the cost of all materials and labor associated with the placement of the gravel section for the pedestrian trails. It shall include the cost of the imported gravel mix, grading, compaction, and associated compaction testing. Measurement and payment for this item will be by the cubic yard (CY).

Bid Item No. 109 – Camp/Tent Pad Subgrade Preparation. This bid item shall include the excavation and subgrade preparation for the campsite living areas and tent pads. Measurement and payment for this item will be by the square yard (SY).

Bid Item No. 110 – Camp Pad Gravel Section (4-inch gravel). This bid item shall include the cost of all materials and labor associated with the placement of the gravel section for the campsite living areas. It shall include the cost of the imported gravel mix, grading, compaction, and associated compaction testing. Measurement and payment for this item will be by the cubic yard (CY).

Bid Item No. 111 – Tent Pad Gravel Section (4-inch pea gravel). This bid item shall include the cost of all materials and labor associated with the placement of the filter fabric, edging and pea gravel section for the tent pads. It shall include the cost of the imported pea gravel, grading, and compaction. Measurement and payment for this item will be by the cubic yard (CY).

Bid Item No. 112 – Precast Concrete Vault Latrine. This bid item shall include the cost of all materials and labor associated with the placement of the precast concrete vault latrines. It shall include the cost of excavation, preparation of the building foundation, and a complete building ready for service, including all doors, vents and appurtenances as indicated in the drawings and specifications. Measurement and payment for this item will be per each (EA).

Bid Item No. 113 – Pump House. This bid item shall include the cost of all materials, freight and labor associated with the placement of the pump house building. It shall include the cost of excavation, preparation of the building foundation, and a complete building ready for service, including all doors, vents, insulation and appurtenances as indicated in the drawings and specifications. Measurement and payment for this item will be per each (EA).

Bid Item No. 114 – Pump House Appurtenances. This bid item shall include the cost of all materials and labor associated with the installation of the necessary plumbing components located inside the pump house, not including the building structure or electrical. Measurement and payment will be by lump sum (LS). Partial payment on lump sum items shall be made on the basis of percent of work completed.

Bid Item No. 115 – Well Pump. This bid item shall include the cost of all materials and labor associated with the installation of the well pump. Measurement and payment will be per each (EA).

Bid Item No. 116 – 1.5-inch HDPE Pipe. This bid item shall include the cost of all materials and labor associated with the installation of the 1.5-inch HDPE pipe. Measurement and payment will be by the linear foot (LF).

Bid Item No. 117 – 1-inch HDPE Pipe. This bid item shall include the cost of all materials and labor associated with the installation of the 1-inch HDPE pipe. Measurement and payment will be by the linear foot (LF).

Bid Item No. 118 – 1.5-inch Curb Stop w/ Stop & Waste. This bid item shall include the cost of all materials and labor associated with the installation of the 1.5-inch curb stop. Measurement and payment will be per each (EA).

Bid Item No. 119 – 1-inch Curb Stop w/ Stop & Waste. This bid item shall include the cost of all materials and labor associated with the installation of the 1-inch curb stop. Measurement and payment will be per each (EA).

Bid Item No. 120 – Mainguard #77 Blowoff. This bid item shall include the cost of all materials and labor associated with the installation of the blowoff hydrants. It shall include the pipe bollards for protection. Measurement and payment will be per each (EA).

Bid Item No. 121 – Yard Hydrant. This bid item shall include the cost of all materials and labor associated with the installation of the yard hydrants. It shall include the pipe bollards for protection, wood post and brackets for support, splash block and washed rock for drainage, and all pipe components from the water service line. Measurement and payment will be per each (EA).

Bid Item No. 122 – Thermaline Water Service. This bid item shall include the cost of all materials and labor associated with the installation of the Thermaline Water service at the camp host site. It shall include all components detailed on the plans and specifications for a complete installation in accordance with the manufacturer's recommendations. Measurement and payment will be per each (EA).

Bid Item No. 123 – Drainfield (100 LF), Septic Tank, & Appurtenances. This bid item shall include the cost of all materials and labor associated with the installation of the drain waste line, septic tank and drainfield. It shall include all components detailed on the plans and specifications for a complete installation. Measurement and payment will be by lump sum (LS). Partial payment on lump sum items shall be made on the basis of percent of work completed.

Bid Item No. 124 – Irrigation System. This bid item shall include the cost of all materials and labor associated with the installation of the base irrigation system along with all lateral lines required for the alternate system. The alternate bid main lines shall be capped in place for future connection. It shall include all components detailed on the plans and specifications for a complete installation, including (but not limited to) the controller, point of connection, valves, mainline and lateral pipes, sleeves, and drip emitters. Measurement and payment will be by lump sum (LS). Partial payment on lump sum items shall be made on the basis of percent of work completed.

Bid Item No. 125 – Electrical Service Secondary #350 MCM. This bid item shall include the cost of all materials and labor associated with the installation of the secondary conductors from the new utility transformer to panel 'B'. Measurement and payment for this item shall be by the lineal foot (LF).

Bid Item No. 126 – Service Secondary 3-inch PVC Conduit. This bid item shall include the cost of all materials and labor associated with the installation of the 3-inch PVC secondary conduits from the new utility transformer to panel 'B'. Measurement and payment for this item shall be by the lineal foot (LF).

Bid Item No. 127 – Electrical Pedestals. This bid item shall include the cost of all materials and labor associated with the installation of the RV power pedestals including excavation, and backfilling. Measurement and payment for this item will be per each (EA).

Bid Item No. 128 – Wire - #2/0 Triplex CU. This bid item shall include the cost of all materials and labor associated with the installation of the RV power pedestal

circuits feeding new campsites B1/B2/B3 and C1/C2/C3. Measurement and payment for this item shall be by the lineal foot (LF).

Bid Item No. 129 – Ground Wire #4. This bid item shall include the cost of all materials and labor associated with the installation of the ground wire that accompanies RV power pedestal circuits. Measurement and payment for this item shall be by the lineal foot (LF).

Bid Item No. 130 – Wire - #3/0 Triplex CU. This bid item shall include the cost of all materials and labor associated with the installation of the RV power pedestal circuits feeding new campsites 5/6/HOST. Measurement and payment for this item shall be by the lineal foot (LF).

Bid Item No. 131 – Wire - #2 Triplex CU. This bid item shall include the cost of all materials and labor associated with the installation of the RV power pedestal circuits feeding new campsites 1/2/3/4. Measurement and payment for this item shall be by the lineal foot (LF).

Bid Item No. 132 – Electrical Trenching/Backfilling. This bid item shall include the cost of all materials and labor associated with the excavation and backfilling of electrical trenches. Measurement and payment for this item shall be by the lineal foot (LF).

Bid Item No. 133 – Electrical Terminations/Vaults/Misc.. This bid item shall include the cost of all materials and labor associated with the installation of vaults, modifications to existing panelboard, and all wiring terminations. Measurement and payment for this item will be per each (EA).

Bid Item No. 134 – Lights. This bid item shall include the cost of all materials and labor associated with the installation of latrine lights. Measurement and payment for this item will be per each (EA).

Bid Item No. 135 – Lighting Circuits - #12's Type UF. This bid item shall include the cost of all materials and labor associated with the installation of circuits to feed the latrine lights. Measurement and payment for this item shall be by the lineal foot (LF).

Bid Item No. 136 – Well Circuit - #10's Type UF. This bid item shall include the cost of all materials and labor associated with the installation of the circuit to the well. Measurement and payment for this item shall be by the lineal foot (LF).

Bid Item No. 137 – Panelboards - 600 AMP. This bid item shall include the cost of all materials and labor associated with the installation of Panel 'B' including all unistrut and other support materials. Measurement and payment for this item will be per each (EA).

Bid Item No. 138 – Panelboards - 100 AMP. This bid item shall include the cost of all materials and labor associated with the installation of panel 'B1'. Measurement and payment for this item will be per each (EA).

Bid Item No. 139 – CT Cans/Meter Bases. This bid item shall include the cost of all materials and labor associated with the installation of the new service CT can and meter base. Measurement and payment for this item will be per each (EA).

Bid Item No. 140 – Pumphouse. This bid item shall include the cost of all materials and labor associated with the installation of all wiring and devices inside the pumphouse. Measurement and payment for this item is by lump sum (LS).

Bid Item No. 141 – Precast Concrete Parking Bumper. This bid item shall include all materials and labor required for placement of the precast parking bumpers, including the cost of all steel reinforcement and anchor rods. Measurement and payment for this item will be per each (EA).

Bid Item No. 142 – Information Kiosk. This bid item shall include all materials and labor required for placement of the park information kiosks as detailed on the plans. The contractor shall coordinate with the owner to obtain the content for the sign panels. Measurement and payment for this item will be per each (EA).

Bid Item No. 143 – New Single-Post Sign. This bid item shall include all materials and labor required for placement of the traffic signs in the locations shown on the plans. They shall include the 4-inch round or square wood posts and mounting hardware. Measurement and payment for this item will be per each (EA).

Bid Item No. 144 – Place and Finish Grade Topsoil. This bid item shall include placement and finish grading of stockpiled topsoil throughout the site, at a minimum in-place compacted depth of 6-inches. The cost of removing organic material, stones, etc., including supplementing with imported topsoil if onsite quantities are insufficient in conformance with Section 02920 of the specifications shall all be incidental to this bid item. Measurement and payment for this item will be by lump sum (LS). Partial payment on lump sum items shall be made on the basis of percent of work completed.

Bid Item No. 145 – Seed Disturbed Areas. This item shall include seed bed preparation, seeding and mulching complete in place in accordance with Section 02920 of the specifications. Seeding shall cover the entire disturbed area from the edge of new roadway and campsite areas to the edge of existing grass. Measurement and payment for this item is by lump sum (LS). Partial payment on lump sum items shall be made on the basis of percent of work completed.

Bid Item No. 146 – Barrier Rock. This bid item shall include all materials and labor required for placement of the barrier rock boulders in the locations shown on

the plans, including excavation, subgrade preparation and finish grading. Measurement and payment for this item will be by the ton (TN).

Bid Item No. 147 – 5/8-inch Minus Clean Crushed Local Stone Mulch. This bid item shall include all materials and labor required for placement of the 5/8-inch minus stone mulch as detailed on the landscape plans. It shall include the cost of excavation, subgrade preparation, weed barrier, steel edging, and finish grading. Measurement and payment for this item will be by the square foot (SF).

Bid Item No. 148 – Conditioned Top Soil for Tree Plantings. This item shall include placement of conditioned top soil around the tree plantings as specified on the landscape details. Measurement and payment for this item is by cubic yard (CY).

Bid Item No. 149 – Trees. This bid item shall include all materials and labor required for placement of the trees as detailed on the landscape plans. It shall include the cost of excavation, subgrade scarification, tree placement, guy posts and wires, protection fencing, finish grading and organic mulch. Measurement and payment for this item will be per each (EA).

END OF SECTION

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SECTION 01610

GENERAL EQUIPMENT REQUIREMENTS

1. SECTION INCLUDES

- A. All equipment furnished and installed under this Contract shall conform to the general stipulations set forth in this section, except as otherwise specified in other sections.

2. GENERAL

- A. Manufacturer's Experience: Unless specifically name in the Specifications, a manufacturer shall have furnished equipment of the type, size and service specified with has been in successful operation at two facilities for not less than the past five years.
- B. Manufacturer shall provide references from their installation, including a contact name and phone number, upon request.
- C. Workmanship and Materials:
 - 1. Contractor shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage, or other failure. Materials shall be suitable for service conditions.
 - 2. All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard sizes and gauges so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except as required by tests.
 - 3. Except where otherwise specified, structure and miscellaneous fabricated steel used in equipment shall conform to AISC standards. All structural members shall be designed for shock or vibratory loads. Unless otherwise specified, all steel which will be submerged, all or in part, during normal operation of the equipment shall be at least 1/4-inch thick.
- D. Seismic Loading Design Provisions: Machinery, equipment, and components such as tanks, piping, and electrical panels, including their supports and anchorages, designed by manufacturers or suppliers shall be designed in accordance with the provisions of the latest International Building Code to withstand seismic loads in addition to other loads. Design shall be performed by a licensed professional engineer familiar with seismic design. Submittals shall be certified, by the Design Engineer, that equipment designs conform to all applicable International Building Code requirements including provisions to withstand seismic load for the following criteria:
 - 1. Seismic Importance Factor, IE = 1.25
 - 2. Spectral response accelerations, SS = 110.2%, S1 = 29.3%

3. Site Class B
4. Seismic Design Category D
- E. Elevation: The elevation of the site is approximately 4200 feet above mean sea level. All equipment furnished shall be designed to meet stipulated conditions and to operate satisfactorily at this elevation.
- F. Listed Manufacturers: The use of a manufacturer's name, model or catalog number is intended to establish a standard of quality and the general configuration required only. Other manufacturer's equipment will be considered in accordance with the GENERAL CONDITIONS.
- G. Single Source: Like items of equipment shall be the end product of one manufacturer in order to achieve standardization.
- H. Manufacturer's Representative:
 1. Manufacturer shall provide a Manufacturer's Representative where specified to assist in the installation, adjustment, startup, certification and operating training.
 2. Manufacturer's Representative shall be an employee of manufacturer who is factory trained and knowledgeable in the technical aspects of the products and systems including both operation and maintenance.
 3. When the services of the representative are specifically required for a listed time period, the days shall represent 8 hours straight time exclusive of Saturdays, Sundays and holidays. Travel time is considered incidental to the work and will not apply to the required listed time.
 4. If listed time is not required or is modified, an appropriate adjustment in payment shall be made. If the provided Manufacturer's Representative is found deficient in training or experience by the Owner or Engineer, the manufacturer shall furnish another acceptable representative.
 5. Any training shall be at the job site at times scheduled by the resident engineer. And will be considered concluded only when the resident engineer is satisfied in regard to complete and thorough coverage.

3. ACCESSORIES

- A. General: All equipment shall be provided with the following accessories as applicable.
- B. Safety Guards: All belt or chain drives, fan blades, couplings, and other moving or rotating parts shall be covered on all sides by a safety guard in complete accordance with the requirements of OSHA. Each guard shall be designed for easy installation and removal. All necessary supports and accessories shall be provided for each guard. Supports and accessories, including bolts, shall be galvanized. All safety guards in outdoor locations shall be designed to prevent the entrance of rain and dripping water.
- C. Anchor Bolts: Equipment manufacturers shall provide anchor bolt size, location, and

loads, including seismic loading. Anchor bolts will be provided by others, unless noted to be supplied by the equipment manufacturer in the Equipment Specifications.

- D. Lifting Lugs: Equipment weighing over 100 pounds shall be provided with lifting lugs.
- E. Special Tools: Equipment requiring periodic repair and adjustment shall be furnished complete with all special tools, instruments, and accessories required for proper maintenance. Equipment requiring special devices for lifting or handling shall be furnished complete with those devices.
- F. Spare Parts:
 - 1. Furnish all spare parts specified or purchased prior to requesting the issuance of a Certificate of Completion and/or operation of the equipment by the Owner.
 - 2. Spare parts and special tools shall be properly packaged to avoid damage, in their original cartons insofar as possible, and shall be stored in a location as determined by the Engineer. Any spare parts found to be damaged or otherwise inoperable at the time of delivery shall be replaced or, if approved by the Engineer, satisfactorily repaired.
 - 3. Spare parts and special tools shall be labeled with a minimum 3-inch by 6-inch manila spare parts tag with such information as the part description, the manufacturer's part number, the applicable equipment description and manufacturer, the quantity of parts delivered in each package, the applicable specification section, and the CONTRACTOR'S and Project's name. This tag shall be firmly affixed to, and prominently displayed on the outside of each package.

4. MISCELLANEOUS

A. Lubrication:

- 1. Equipment shall be adequately lubricated by systems which require attention no more frequently than weekly during continuous operation. Lubrication systems shall not require attention during startup or shutdown and shall not waste lubricants.
- 2. Lubricants of the type recommended by the equipment manufacturer shall be provided in sufficient quantity to fill all lubricant reservoirs and to replace all consumption during testing, startup, and operation prior to acceptance of equipment by Owner. Unless otherwise specified or permitted, the use of synthetic lubricants will not be acceptable.
- 3. Lubrication facilities shall be convenient and accessible. Oil drains and fill openings shall be easily accessible from the normal operating area or platform. Drains shall allow for convenient collection of waste oil in containers from the normal operating area or platform without removing the unit from its normal installed position.

B. Shop Painting:

1. All steel and iron surfaces shall be protected by suitable paint or coatings applied in the shop. Surfaces which will be inaccessible after assembly shall be protected for the life of the equipment. Exposed surfaces shall be finished, thoroughly cleaned, and filled as necessary to provide a smooth, uniform base for painting. Electric motors, speed reducers, starters, and other self-contained or enclosed components shall be coated with high-grade, oil resistant enamel. Coatings shall be suitable for the environment where the equipment is installed. Color shall be the manufacturer's standard, unless stated otherwise in the Technical Specifications.

5. PREPARATION FOR SHIPMENT

A. Preparation:

1. All equipment shall be suitably packaged to facilitate handling and protect against damage during transit and storage. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to the elements and shall be kept dry at all times.
2. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. Painted surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of Engineer.
3. Grease and lubricating oil shall be applied to all bearings and similar items.
4. Each item of equipment shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

6. OPERATION AND MAINTENANCE (O&M) MANUALS

- A. In addition to any requirement of other specifications, the manufacturer shall furnish four (4) copies of a complete instruction manual for installation, operation, maintenance, and lubrication requirements for each component of mechanical and electrical equipment or system. Each instruction manual furnished shall be clearly labeled to designate the system or equipment for which it is intended with reference to the building and equipment number. And the specification section where the item is specified.
- B. The manuals shall be furnished with shop drawing submittals; in no case shall submission of the manuals be delayed beyond 75 percent completion point of the work. Submission of the manuals shall precede payment for all work completed in excess of the 75 percent completion level on the particular equipment and systems for which the manuals are due. Any deficiencies found by the Engineer to exist in the manuals submitted shall be corrected within 30 calendar days following notification of the deficiencies.
- C. Each instruction manual shall include, but not be limited to the following:
 1. Diagrams and illustrations.

2. Detailed description of the function of each principal component of the system.
 3. Performance and nameplate data.
 4. Installation instructions.
 5. Procedure for starting.
 6. Proper adjustment.
 7. Test procedures.
 8. Procedure for operating.
 9. Shutdown instructions.
 10. Emergency operating instruction and troubleshooting guide
 11. Safety precautions
 12. Maintenance and overhaul instruction which shall include detailed assembly drawings with part numbers, parts list, instructions for ordering spare parts, and complete preventive maintenance instructions required to ensure satisfactory performance and longevity of the equipment.
 13. Lubrication instructions, which shall list points to be greased or oiled, shall recommend type, grade, and temperature range of lubricants, and shall recommend frequency of lubrication.
 14. List of electrical relay settings and control and alarm contact settings.
 15. Electrical interconnection wiring diagram for equipment, including all control and lighting systems.
- D. Manuals shall be complete in all respects for all equipment, controls, accessories, and associated appurtenances.
- E. Manuals shall be assembled in one or more binders, each with title page, typed table of contents, and heavy section dividers with numbered plastic index tabs. Each manual shall be divided into sections paralleling the Equipment Specifications. Binders shall be three-ring, hard-back type. All data shall be punched for binding and composition and printing shall be arranged so that punching does not obliterate any data. The project title, division designation, and manual title printed thereon shall be as furnished by the Engineer.
- F. When more than one binder is required, they shall be labeled "Vol. 1." "Vol. 2," and so on. The table of contents for the entire set, identified by volume number, shall appear in each binder. Submit manual organization and format to the Engineer for approval prior to manual preparation.
- G. Each O&M Manual shall be transmitted to the Engineer prior to installation of the

equipment and all equipment shall be serviced in accordance with the manufacturer's recommendations prior to operation. A service record shall be maintained on each item of equipment and shall be delivered to the Engineer prior to final acceptance of the project.

7. WARRANTY

- A. A manufacturer's warranty is required for each piece of equipment as defined in the Contract General Conditions. The One-Year Correction Period shall begin at Substantial Completion of the entire project and end one year after final acceptance of the project.

8. TESTS

- A. Pre-test mechanical and electrical equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Final tests will not be conducted unless pre-tested.
- B. Conduct final tests required in various sections of specifications in presence of authorized representative of the Contracting Officer. CONTRACTOR shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.

END OF SECTION

SECTION 01750

FINAL CLEANUP

PART 1 GENERAL

1. DESCRIPTION

- A. This work consists of final cleanup of the project site prior to final acceptance.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

1. CONTRACTOR RESPONSIBILITIES

The contractor shall be responsible for final clean up at the end of the project to a level satisfactory to the owner. All construction debris, no matter how small, shall be collected and removed from the site. All wheel ruts shall be filled in and be leveled to match the adjacent grade and material. Re-seeding or re-sodding, or other re-surfacing may be necessary to repair any construction related impacts or damage.

All survey markings, stakes, temporary paint marks, flagging and other devices shall be removed regardless of who installed them. All excess pavement, concrete, gravel, soil, or other construction materials not intended for permanent use shall be removed.

All final slopes shall be dressed manually to remove woody debris, accumulated trash and oversized material. Any new slope or topsoil surfaces shall be hand raked to provide a uniform appearance. The contractor shall dress all gravel, pavement, and concrete edges to eliminate abrupt edges and provide a smooth transition. All construction related temporary sediment control devices shall be removed as soon as practical.

PART 4 MEASUREMENT AND PAYMENT

1. PAYMENT

Unless specifically noted otherwise, all final cleanup work shall be incidental to other work items in the contract and no separate payment shall be made.

END OF SECTION

SECTION 02535

WASTEWATER TREATMENT AND DISPOSAL SYSTEM

PART 1 GENERAL

1. WORK INCLUDED

- A. This section covers the work necessary to furnish and install piping, tanks, and infiltration chambers for the construction and startup of a complete wastewater treatment and disposal system.
- B. Work included in this section is as follows:
 - 1. Wastewater Piping and Valves
 - 2. Septic Tank
 - 3. Drain Field

2. GENERAL

- A. The Drawings do not show all details of all piping systems, and instead only portray the functionality required. The CONTRACTOR shall provide all accessories, adapters, appurtenances, and supports to achieve a complete and functional installation. The CONTRACTOR shall verify all piping routings and locating dimensions shown for conflicts with other piping or utilities, and shall provide any offsets required to achieve clearance at no additional cost to the OWNER. In the event changes to the locations of equipment or piping shown are necessary, the CONTRACTOR shall submit such changes in writing to the ENGINEER before proceeding with such changes.
- B. Manufacturers' references are included herein for reference and to establish the required level of quality; "or equal" products may be proposed subject to the requirements for submittal review.

3. CODES, PERMITS, AND COMPLIANCE

- A. Plumbing under these Specifications shall conform to all requirements of the current codes, standards, and ordinances applicable to work. In event of conflicts between these Specifications and applicable codes or standards, the codes and standards shall govern.
- B. All piping, wastewater system components, and accessories shall be installed in strict accordance with the laws and regulations of the State of Montana and Carbon County.
- C. Any permits legally required for the work under these Specifications shall be the responsibility of the CONTRACTOR to obtain. Costs of such permits and scheduling of any inspections required in conjunction with such permits or associated requirements shall be the responsibility of the CONTRACTOR.
- D. Completed piping systems shall be tested by the CONTRACTOR in accordance with all applicable codes and standards before charging such piping with wastewater.

4. SUBMITTALS

A. The CONTRACTOR shall provide the following information:

1. Provide manufacturers' catalog information, brochures, warranties and operation and maintenance manuals for each product used in the system.

PART 2 PRODUCTS

1. SEWER PIPE

- A. Gravity Pipe - Gravity pipe shall be minimum 4-inch diameter schedule 40 PVC pipe and fittings joined with solvent weld joints.
- B. All pipe shall meet the requirements of ASTM D1785.

2. SEPTIC TANK

- A. Septic tanks shall meet the standards for septic tanks, Montana Department of Environmental Quality (MDEQ), Circular DEQ 4, and Chapter 7. Tanks shall be manufactured as by a qualified Concrete Septic Tank Manufacturer.
- B. Tank construction requirements include, but are not limited to the following:
 1. Septic tanks shall be constructed of precast concrete.
 2. Tanks shall be structurally sound and capable of withstanding loads created by 6-feet of burial depth to the top of the tank.
 3. The walls and floor of the tank shall be a minimum of 3-inches thick if adequately reinforced with steel and a minimum of 6-inches thick if not reinforced. Concrete for septic tanks shall have a water/cement ratio of less than 0.45, a 28 day compressive strength of at least 4,000 psi and shall be made with sulfate resistant cement (tricalcium aluminate content of less than 8 percent).
 4. Concrete covers shall be a minimum of 3-inches thick and adequately reinforced.
 5. The inlet into the tank shall be 4-inches minimum in diameter and shall enter the tank 3-inches above the liquid level.
 6. Tees or baffles shall extend a minimum of 7-inches above the liquid level.
 7. Double compartment septic tanks shall be constructed so the second compartment vents to the first compartment and the first compartment shall vent to the gravity sewer line inlet.
 8. All septic tanks shall have an air space that is 20% or greater than the liquid capacity of the tank.
 9. All septic tanks shall be tested in place for water tightness by means of a water or vacuum test (as per DEQ-4, Chapter 7.3).

- C. Tank risers shall be 30-inch diameter minimum, constructed of a PVC material or precast concrete with concentric ribs. Risers shall be solidly secured to the septic tank. Lids shall be precast concrete or fiberglass construction, secured to the riser with SS bolts, green in color, and shall include a polyurethane gasket to provide a water tight seal. PVC Risers and fiberglass lids, if used, shall be as manufactured by Orenco or approved equal.

3. EFFLUENT FILTER

- A. Septic tank outlets shall be equipped with an effluent filter. Effluent filters shall be PVC housing and handle with a filter cartridge with an effective opening of 1/8-inch.
- B. Effluent filters shall be designed for a flowrate of 100 gpd.
- C. Effluent Filter shall be Orenco model FTS0444-36A, or ENGINEER approved equal.

PART 3 EXECUTION

1. TRENCHES

- A. Pipe trenches shall be constructed as detailed in the Montana Public Works Standard Specifications, latest edition.
- B. Drain field trenches shall be constructed as shown on the plans. Construction of trenches shall not occur if soil moisture is high. The Engineer will determine if conditions are acceptable for construction. The Contractor shall take care not to compact the drain field area.

2. PIPING

- A. Gravity piping shall be installed on straight line grade between the septic tank and the entrance to the drain field manifold.

3. INFILTRATION CHAMBERS (if installed in lieu of gravel trench)

- A. Install infiltration chambers in accordance with manufacturer's recommendations.
- B. The infiltration chamber bed shall be level, free of irregularities and debris.

4. TANKS

- A. Tanks shall be installed as detailed in the plans and according to manufacturer's recommendations. Placement of individual septic tanks shall meet all the requirements set forth in Circular DEQ 4. Upon installation the center seam and all penetrations shall be grouted with a sand based cement grout on both sides. All tanks shall be tested for leakage after installation. The Contractor shall coordinate the testing with the Engineer. The Engineer or the Engineer's representative shall witness the testing.

END OF SECTION

SECTION 02760

IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Furnishing and installation of all exterior irrigation system components.
 - 2. Furnishing and installing all low voltage control wiring, including connection into controller terminal strip.
 - 3. Furnishing and installing irrigation system controller, excluding 120 volt wiring.
- B. Trenching and backfill for irrigation system components are specified in Section 02221 of the Montana Public Works Standard Specifications.
- C. Pipe bedding shall be 3/8-inch gravel or sand.
- D. Furnishing and installation of irrigation system related components are specified by Division 15 Mechanical and Division 16 Electrical Sections.
 - 1. Mechanical Contractor shall furnish and install backflow prevention device. Mechanical Contractor shall stub water source out of new tunnel 18 inches (45.7 cm) below grade and terminate with a slip cap.
 - 2. Electrical Contractor shall furnish and install all 120 volt or greater wiring, including all necessary conductors, raceways and conduits, breakers, fuses, label plates and miscellaneous items required for a complete functioning installation.

1.3 QUALITY ASSURANCE

- A. Qualifications of Installer: Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and material manufacturer's

recommended methods of installation and who shall direct all work performed under this section.

- B. Coordination of Work: All work of this section, and the installation of all lawns and all plant materials shall be performed by one Contractor.
- C. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with the latest rules of the National Electrical Code for all electrical work and materials. Where provisions of pertinent codes and standards conflict with the requirements of this section of these Specifications, the more stringent provisions shall govern.

1.4 SUBMITTALS

- A. Material List: Before any irrigation system materials are delivered to the job site, submit to the Landscape Architect a complete list of all irrigation system materials proposed to be furnished and installed.
 - 1. Show manufacturer's name and catalog number for each item, furnish complete catalog cuts and technical data, and furnish the manufacturer's recommendations as to method of installation.
 - 2. Do not permit any irrigation system component to be brought onto the job site until it has been approved by Landscape Architect.

1.5 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect irrigation system materials before, during, and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Landscape Architect and at no additional cost to the Owner.

PART 2 - MATERIALS

2.1 PIPE:

- A. Plastic Pipe:
 - 1. All plastic pipe shall be rigid Schedule 40 PVC conforming to ASTM D-1784 and D-2241 standard specifications for PVC plastic pipe, or as shown in drawings. The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, deleterious, wrinkles, and dents.

2. All pipe shall be continuously and permanently marked with the following information. Manufacturer's name or trademark, size, schedule and type of pipe, working pressure at 73 degrees F (22.8 degrees C). and National Sanitation Foundation (N.S.F.) approval.
3. All pipe 2-1/2 inches (6.4 cm) and smaller shall be slip type joints. All pipe 3 inches (7.6 cm) and larger shall be gasket type joints. All pipe fittings to be installed for pipe 2-1/2 inches (-6.4 cm) and smaller shall be molded fittings manufactured of the same material as the pipe and shall be suitable for solvent weld or threaded connections. All pipe fittings to be installed for pipe 3 inches (7.6 cm) and larger shall be epoxy coated steel fittings with compression gaskets as manufactured by Pierce, PO Box 528, Eugene, OR 97440,(503-485-3111), or approved equal.
4. Slip fitting socket taper shall be so sized that a dry unsoftened pipe end, conforming to these special provisions, can be inserted no more than halfway into the socket. Plastic saddle and flange fittings will not be permitted. Only schedule 80 pipe or fittings may be threaded.
5. When connection is plastic to metal, plastic male adapters shall be used. The male adapters shall be hand tightened, plus one turn with a strap wrench. Joint compound shall be Teflon Tape only.

2.2 RISERS

- A. Spray Heads: All stationary spray heads shall have risers of high density polyethylene plastic pipe ("funny pipe") with spiral barbed ell fittings. Minimum length of "funny pipe" shall be 18 inches (45.7 cm).
- B. Shrub Bubblers: All risers for shrub bubblers shall be schedule 80 PVC plastic pipe, unless otherwise specified or shown on the plans. The risers shall be of sufficient height so as not to cause any interruption of the stream from the sprinkler nozzle when the plant material has reached its optimum growth. Minimum height 12 inches (30.5 cm) above finish grade.
- C. Rotor Pop-up Sprinklers: All rotor pop-up sprinklers shall have an adjustable rise assembly(double swing joint riser) assembled by the use of at least 3 standard PVC 90 degree ells or tees. These double swing joint risers shall be of schedule 80 PVC plastic pipe and fittings unless otherwise designated on the plans. The horizontal nipple connected directly into the side outlet of the main line shall be a minimum of 8 inches (20.3 cm) long. All other nipples of the swing joint riser shall be of a length as required for proper installation of the sprinkler head. The swing joint riser shall be of proper pipe size to match head threads.

2.3 MANUAL VALVES

- A. Gate Valves:

1. All manual gate valves, sizes 2 inches (5 cm) and smaller, shall be all bronze double disc wedge type with integral taper seats and with non-rising stem.
2. All gate valves of 2-1/2 inches (6.4 cm) size or larger shall be iron body, brass trimmed, double disc wedge type with integral taper seats and with non-rising stems, 125 PSI rated. Gate valves shall function and be equal to PGL 701-A flanged, PGL 705-A threaded, or PGL 708-A gasketed.

2.4 VALVE BOXES

- A. All remote control valves, manual control valves, zone shut-off valves, gate valves or globe valves unless otherwise indicated, shall be installed in valve access box of proper size as required for easy access to the valve. Standard valve box to be Carson 1419-12B with locking green cover.

2.5 SPRINKLER HEADS

- A. Sprinkler heads shall be of the types and sizes as indicated on the plans. They shall be constructed of bronze, brass, stainless steel, cast iron and/or non-metallic materials. All heads of a particular type and for a particular function in the system shall be of the same manufacturer and shall be marked with the manufacturer's name and identification, in such a position that they can be identified without being removed from the system.

2.6 AUTOMATIC IRRIGATION CONTROLLER

- A. The automatic irrigation controller shall be 117 volt input, 26.5 volt output, with the number of valve stations and in the type and model number indicated on the plans.

2.7 AUTOMATIC REMOTE CONTROL VALVES

- A. All remote control valves shall be globe or angle pattern in type and model numbers as indicated on the plans. All valves shall be 24-volt, with epoxy-sealed solenoid coils and throttling stem.

2.8 CONTROL CABLE

- A. All electrical control and ground wire shall be Rainbird irrigation control cable or approved equal, 14 gage unless otherwise indicated on the drawings. All wiring to be used for connecting the automatic remote control valve to the automatic controllers shall be Type "UF", 600 volt, stranded or solid copper, single conductor wire with PVC insulation and bear UL approval for direct underground burial feeder cable.
- B. All control or "hot" wires shall be of one color (black) and all common or "ground" wires shall be of another color (white). When more than one valve is operated by a

single controller station provide separate control wire from the controller to each valve.

- C. Verification of wire types and installation procedures shall be checked to conform to local codes.

2.9 OTHER MATERIALS

- A. Materials to be Furnished: Supply as part of this contract the following tools:

1. Two keys for each automatic controller.
2. Five quick couplers and matching hose swivel.

The above equipment shall be turned over to the Owner at the conclusion of the project. Before final inspection can occur, evidence that the Owner has received materials must be shown to the Landscape Architect.

- B. All other materials, not specifically described but required for a complete and proper irrigation system installation, shall be new, first quality of their respective kinds, and subject to the approval of the Landscape Architect.

3.1 SURFACE CONDITIONS

- A. Inspection: Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Verify that irrigation system may be installed in strict accordance with all pertinent codes and regulations, the original design, the referenced standards, and the manufacturer's recommendations.
- B. Discrepancies: In the event of discrepancy, immediately notify the Landscape Architect. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 FIELD MEASUREMENTS

- A. Make all necessary measurements in the field to ensure precise fit of items in accordance with the original design.

3.3 TRENCHING AND BACKFILLING

- A. Perform all trenching and backfilling as specified by this Specification.

3.4 INSTALLATION OF PIPING

- A. Layout the piping system in strict accordance with the plans. Where piping is shown on the plans to be under paved areas but running parallel and adjacent to planted areas, the intention is to install the piping in the planted areas.
- B. Pipe Depth: All mainlines shall be installed with 18 inches (45.7 cm) minimum cover over the pipe. All laterals shall be installed with 12 inches (30.5 cm) minimum cover over the pipe.
- C. Line Clearance: All lines shall have a minimum clearance of 4 inches (10.2 cm) from each other, and 6 inches (15.2 cm) from lines of other trades, except through pipe sleeves. Parallel lines shall not be installed directly over one another.
- D. Inspection of Pipe and Fittings: Carefully inspect all pipe and fittings before installation, removing all dirt, scale, and burrs and reaming as required; install all pipe with all markings up for visual inspection and verification.
- E. Plastic Pipe:
 - 1. Plastic pipe shall be installed in a manner so as to provide for expansion and contraction as recommended by the manufacturer.
 - 2. All plastic joints shall be solvent-weld joints or slip seal joints. Only the solvent cement recommended by the pipe manufacturer shall be used. All plastic pipe and fittings shall be installed as outlined and instructed by the pipe manufacturer and it shall be the Contractor's responsibility to make arrangements with the pipe manufacturer for any, field assistance that may be necessary. The Contractor shall assume full responsibility for the correct installation.
 - 3. Slip seal gasketed joints shall be used on all pipe 3 inches (7.6 cm) and larger.
 - 4. All plastic to metal joints shall be made with plastic male adapters.
 - 5. The solvent-weld joints shall be made dry.
 - 6. The solvent-weld joints shall be allowed to set at least 24 hours before pressure is applied to the system on PVC pipe.
- F. Thrust Blocks:
 - 1. Provide concrete thrust blocks for all pipe as required by the schedule on the plans.
 - 2. All thrust blocks shall bear directly on undisturbed earth. Center pipe in the middle of thrust block.

3.5 INSTALLATION OF EQUIPMENT

- A. General:

1. All fittings, valves, etc. shall be carefully placed in the trenches as shown on the plans.
2. All control wires shall be clearly labeled, by station using weatherproof material, both at the controller and at the valve. The inside cover of all automatic valve boxes shall also have the station number clearly painted in white.
3. All sprinklers, having adjustable nozzles, shall be adjusted for proper and adequate distribution of the water over the coverage pattern of the sprinkler.
4. All nozzles on stationary pop-up sprinklers or stationary spray heads shall be tightened after installation. All sprinklers having an adjusting screw, adjusting stem or adjusting friction collars shall be adjusted as required for the proper arc of coverage, radius, diameter and/or discharge.

B. Lawn Sprinkler Heads:

1. Install lawn sprinkler heads where indicated on the plans and in strict accordance with the manufacturer's recommendations.
2. In seeded areas, set open case rotor heads 4 inches (10.2 cm) above grade on temporary risers or use rotor dams for the maintenance period.
3. Along walks and driveways where finished grade is established, set all heads 1/4 inch (64mm) below surface of pavement at time of installation and 1-1/2 inches (3.8 cm) from pavement. Stake all temporary risers.
4. Set all heads to final grade where sod lawn will be installed.
5. Upon completion of maintenance period, reset all lawn sprinkler heads flush with grade and firmly anchor with soil.
6. One-half to one cubic foot (.02 m³ to .03 m³) minimum, of 3/4 inch (19 mm) washed aggregate shall be placed around each open case rotor pop-up sprinkler head when it is set to grade, for drainage of water from sprinkler case.

3.6 TESTING AND INSPECTION

- A. Closing-in Uninspected Work: Do not allow or cause any of the work in this section to be covered up or enclosed until it has been inspected, tested, and approved by the Landscape Architect. Where trenches are not closed at the end of the day Contractor shall accept all liability for any damage or injury that may result from open trenches. Provide barricades and warning tape as necessary around all open trenches.
- B. Flushing: Before backfilling the mainline, and with all control valves in place, but before lateral pipes are connected, completely flush and test the mainline and repair for all leaks; flush out each section of lateral pipe before sprinkler heads are attached.
- C. Testing:

1. Make all necessary provisions for thoroughly bleeding the line of air and debris.
2. Before testing, fill the line with water for a period of at least 24 hours.
3. After valves have been installed, test all live water lines for leaks at a pressure of 100 psi for a period of two hours, with all couplings exposed and with all pipe sections centerloaded.
4. Furnish all necessary testing equipment and personnel.
5. Correct all leaks and retest until acceptance by the Landscape Architect.

D. Final Inspection:

1. Thoroughly clean, adjust, and balance all systems.
2. Demonstrate the entire system to the Landscape Architect, proving that all remote control valves are properly balanced, that all heads are properly adjusted for radius and arc of coverage, and that the installed system is workable, clean, and efficient.

3.7 INSTRUCTIONS

A. Record Drawings:

1. Record accurately on one set of black and white prints of the site plan all installed work including both pressure and non-pressure lines.
2. Upon completion of each increment of work, transfer all such information and dimensions to the print. The dimensions shall be recorded in a legible and workmanlike manner. Maintain as-built drawings on site at all times. Make all notes on drawing in pencil (no ball point pen). When the work has been completed, transfer all information from the field record print to a set of reproducible drawings.
3. Dimension from two permanent points of reference (buildings, monuments, sidewalks, curbs, pavement, etc.). Locations shown on as-built drawings shall be kept day to day as the project is being installed. All dimensions noted on drawings shall be 1/8 inch (32mm) in size (minimum).
4. Show locations and depths of the following items:
 - a. Point of connection
 - b. Routing of sprinkler pressure lines
 - c. Gate valves
 - d. Sprinkler control valves
 - e. Quick coupling valves
 - f. Routing of control wires
 - g. Sprinkler heads
 - h. Other related equipment

B. Controller Charts:

1. As-built drawings must be approved by Landscape Architect before charts are prepared.
2. Provide one controller chart for each controller supplied showing the area covered by automatic controller, of the maximum size controller door will allow.
3. The chart is to be a reduced drawing of the actual as-built system. Chart shall be a photo positive with different colored shading used to show area of coverage for each station. When completed and approved, the chart shall be hermetically sealed between two pieces of plastic. The chart shall be mounted in the controller using Velcro or equal type of semi-permanent fastening device.
4. These charts must be completed and approved prior to final acceptance of the irrigation system by the Owner.

C. Operation and Maintenance Manuals: Prepare and deliver to the Landscape Architect within ten calendar days prior to completion of construction, four individually bound copies of the operations and maintenance manual. The manual shall describe the material installed and shall be in sufficient detail to permit operating personnel to understand, operate and maintain all equipment. Spare parts lists and related manufacturer information shall be included for each equipment item installed. Each complete, bound manual shall include the following information.

1. Index sheet stating Contractor's address and telephone number, duration of guarantee period, list of equipment with names and addresses of local manufacturer representatives.
2. Complete operating and maintenance instructions on all major equipment.
3. In addition to the above maintenance manuals, provide the maintenance personnel with instructions for system operation and show written evidence to the Owner at the conclusion of the project that this service has been rendered.

3.8 GUARANTEE PERIOD

- A. Guarantee: The entire irrigation and water system shall be guaranteed to give satisfactory service for a period of one year from date of acceptance by the Owner. Should any trouble develop within the time specified above due to inferior or faulty materials or workmanship, the trouble shall be corrected at no expense to the Owner. Any and all damages resulting from faulty materials or workmanship shall be repaired by the Contractor to the satisfaction of the Owner, at no cost to the Owner.

B. Guarantee Period Services:

1. The Contractor shall winterize the system and perform spring start-up of the system during the guarantee period. These functions shall be coordinated in advance with the Owner, and the Owner's personnel shall be encouraged to participate.
2. Upon re-energizing the system, the Contractor shall repair any leaks or breaks and shall check each head and valve, making any adjustment necessary.

END OF SECTION

SECTION 02920

LANDSCAPING

PART 1. GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Furnishing all plants, labor, equipment, and performing all planting of trees, shrubs and groundcovers.
 - 2. Furnishing and installing irrigation system components as specified in Section 02760 of this Specification.
- B. Related Sections include the following:
 - 1. Montana Public Works Standard Specifications.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; by mixing with soil amendments.
- C. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Certification of Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
 - 1. Certification of each seed mixture, identifying source, including name and telephone number of supplier.
- C. Product Certificates: For soil amendments and fertilizers, signed by product manufacturer.
- D. Qualification Data: For landscape installer.
- E. Material Test Reports: For existing surface soil and imported topsoil.
- F. Seeding Schedule: Indicating anticipated seeding dates for each type of seeding.
- G. As-Built Drawings: Maintain at the site at all times, one set of black and white prints of the site plan. Indicate all installed work, including any deviations from the original plan.

1. Upon the completion of each increment of work, transfer all such information and dimensions to the prints.
2. Submit all as-built information to the Owner's Representative at the final inspection.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.
 1. Installer's Field Supervision: Require installer to maintain an experienced full-time supervisor on project site when seeding is in progress.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
 1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.
- D. Coordination of Work: All work of this section, and the installation of all irrigation systems and all lawns shall be performed by one Contractor.

1.6 DELIVERY, STORAGE, AND HANDLING

1. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.7 SCHEDULING

- A. Seeding Restrictions: Seed during one of the following periods. Coordinate seeding periods with maintenance periods to provide required maintenance from date of Substantial Completion.
 1. Non-irrigated areas must be seeded between October 1 and April 15.
- B. Weather Limitations: Proceed with seeding only when existing and forecasted weather conditions permit.

1.8 STANDARDS

- A. All plants and planting materials shall meet or exceed the Specifications of federal, state, and county laws requiring inspection for plant disease and insect control. Quality and size shall conform with the current edition of American Standards for Nursery Stock, ANSI Z60.1, as adopted by the American Association of Nurserymen, and with the schedule shown on the plans.
- B. All plants shall be true to name and one of each bundle or lot shall be tagged with the name and size of the plants in accordance with the standards of practice of the American Association of Nurserymen. In all cases, botanical names shall take precedence over common names.

PART 2. PLANT MATERIALS

2.1 PLANT MATERIALS

- C. General: Plant materials shall mean trees, shrubs, groundcovers and plants of all descriptions, required to be furnished for the project, in accordance with the plans and specifications. All plant material must be true to name, which shall conform to Standardized Plant Names of the American Joint Committee on Horticultural Nomenclature, and shall be legibly tagged with the name and size of the material according to the general nursery practice as recommended by the American Association of Nurserymen.
- D. Condition: All plants shall be first class representatives of their normal species or varieties. Unless otherwise specified, plants shall have average or normally developed branch systems and vigorous root systems. Plants shall be free from scale, disfiguring knots, sun scald injuries, abrasions of the bark, or other objectionable blemishes. Weak plants will not be accepted. Plants must show appearance of normal health and vigor in strict accordance with these Specifications. All stock shall be nursery grown.
- E. Disease: All plant material shall comply with state and federal laws with respect to inspection for plant disease and infection. Any inspection certificates required by law shall accompany each shipment, invoice, or order of stock.
- F. Size Variance: When planted in masses, plants shall be subject to tests that will eliminate more than twenty (20%) percent variance from uniform size and that will ensure at least fifty (50%) percent conformity to larger rather than smaller Sizes.
- G. Inspection: All plant material shall be subject to approval and inspection at any place, before, during and/or after planting. Any plant material not approved by the Landscape Architect shall be immediately removed from the site. No plant material shall be accepted with loose or broken balls.

2.2 OTHER MATERIALS

- A. Guying Materials: Stakes shall be 2 inches (5 cm) square fir stakes, minimum length 3 feet (.9m), with the exposed portion of the stake painted dark green or brown. Guys shall be canvas or cloth straps. Staking is not mandatory, see details.
- B. Mulch: Mulch shall be commercially prepared 5/8" minus clean crushed local stone mulch for all mulch areas (per plans). Submit samples for approval prior to installation.
- C. Weed Barrier Fabric: Weed barrier fabric shall be Tytar Style 3201, as manufactured by Reemay Company or approved equal.

2.3 SEED

- A. Restoration Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed Species: State-certified seed species, as follows: Dryland Native Mix per Northwest Seed Co. (Billings, MT)

2.4 TOPSOIL

- A. The topsoil shall be loose, friable, and shall contain an ordinary amount of humus. It shall contain no lumps of soil, rocks larger than 1 inch (2.54 cm), or sticks, roots, and other debris. It shall be sufficiently fertile to sustain normal

healthy plant growth and shall not have a pH value higher than 7.0 or lower than 5.5. The topsoil shall be delivered in an unfrozen and non-muddy condition and must meet the approval of the Landscape Architect.

1. Amendments and fertilizers required to allow the soil to meet these requirements shall be completely incorporated into all topsoil fill by rototilling or other approved means.
2. Topsoil Source: Strip, stockpile and reuse surface soil stockpiled on-site. Verify suitability of stockpile surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, lumps, and other extraneous materials harmful to plant growth.
 - a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from bogs or marshes.

2.5 PLANTING ACCESSORIES

- A. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

2.6 MULCHES

- A. Rock Mulch: 5/8" minus clean crushed local stone mulch; free of plant-growth or germination inhibitors; free of dirt and any deleterious debris.

2.7 EROSION-CONTROL MATERIALS

- A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long (see plan sheets).
- B. Erosion-Control Fiber Mesh: Biodegradable twisted jute or spun-coil mesh, a minimum of 0.92 lb/sq. yd. (0.5 kg/sq. m), with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long (see plan sheets).

PART 3. EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Discrepancies: In the event of a discrepancy, immediately notify the Owner's Representative. Do not proceed with installation until such discrepancies have been resolved.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

- B. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 LAWN PREPARATION

- A. Limit lawn subgrade preparation to areas to be planted. Protect all existing vegetation designated to remain. Prevent the spread of and control any noxious weed infestation by spot spraying with approved herbicides.
- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6-inches. Remove stones larger than 1-inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
 - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - 2. Spread planting soil mix to a depth of 4-inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - a. Spread approximately one-half the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 4-inches (100 mm) of subgrade. Spread remainder of planting soil mix.
- C. Unchanged Subgrades: If native grasses are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil as follows:
 - 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 - 2. Loosen surface soil to a depth of at least of 6-inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4-inches of soil. Till soil to a homogeneous mixture of fine texture.
 - a. Apply fertilizer directly to surface soil before loosening.
 - 3. Remove stones larger than 1-inch (25 mm) in any dimension and sticks, roots, trash, and other extraneous matter.
 - 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus ½-inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.
 - 1. Compaction of the topsoil layer shall be +/- 85% maximum dry density.
- E. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Restore areas if eroded or otherwise disturbed after finish grading and before

planting.

- G. All finished grades shall meet approval of the Owner's Representative before seed is sown.

3.4 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 - 1. Sow seed into the top 1/2-inch of the prepared seed bed.
 - 2. A drill type seeder with spacing not greater than 1/2-inch is required for seeding all drill accessible areas.
 - 3. All areas that can be drill seeded must be drill seeded.
 - 4. Do not use wet seed or seed that is moldy or otherwise damaged.
- B. Compaction: When seeding is done by drilling and the surface is unduly loose, compact the seedbed by an agricultural roller, cultipacker, or compactor.
 - 1. Compact not more than 24 hours after seeding.
 - 2. Compaction is not required where a roller-type grass seeder has been used.
- C. Protect seeded areas with slopes exceeding 3:1 with erosion control fiber mesh installed and stapled according to manufacturer's written instructions.
- D. Protection: Protect all seeding areas by erecting temporary fences, barriers, signs, etc. to prevent traffic.
 - 1. Protection for at least 8 weeks unless other arrangements are made with the Owner's Representative.
- E. Protect seeded areas from hot, dry weather or drying winds by applying fiber mulch within 24 hours after completing seeding operations.

3.5 HYDROMULCHING

- A. Hydromulch all lawn seeded areas on slopes greater than 5:1 and greater. Topsoil or seed which washes out for reasons attributable to Contractor's activities shall be replaced at contractor's expense.
 - 1. Mulch shall not be applied in the presence of free surface water, but may be applied on damp ground.
- B. Protect all structures from hydraulic application of mulch materials. Any material deposited on walks, streets, inlets or other structures shall be removed.
- C. Organic mulch shall be mixed with water at a rate of one pound mulch (dry rate) to one gallon of water.
 - 1. Hydraulically apply as per manufacturer's recommendations at a rate of 1500 lbs. per acre.
- D. Tackifier: Mix with water at a rate specified by the manufacturer.
 - 1. Apply at a minimum rate of 30 lbs/acre.

3.6 LAWN RENOVATION

- A. Renovate existing lawn damaged by Contractor's operations.
 - 1. Re-establish lawn where settlement or washouts occur or where minor regrading is required.
- B. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil.
- C. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.
- D. Mow and de-thatch existing lawn.
- E. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
- G. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6-inches (150- mm).
- H. Apply soil amendments and initial fertilizers required for establishing new lawns and mix thoroughly into top 4-inches (100 mm) of existing soil. Provide new planting soil to fill low spots and meet finish grades.
- I. Apply seed as required for new lawns.
- J. Water newly planted areas and keep moist until new lawn is established.

3.7 SATISFACTORY LAWNS

- A. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 10 by 10 inches (125 by 125mm).
- B. Re-establish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.
- C. Replacements required because of vandalism or other causes beyond the control of the Contractor are not part of this contract.
- D. Extension of Maintenance Period: Continue the maintenance period at no additional cost to the Contract until all noted deficiencies have been corrected, at which time the final inspection shall occur by the Owner's Representative.

3.8 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels on vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect barricades and warning signs as required for protecting newly planted areas from pedestrian and vehicular traffic. Maintain barricades throughout maintenance period and remove after lawn is established.
- C. Remove erosion control measures after grass establishment period.

3.9 STAKING TREES

- A. All trees may be guyed with three stakes driven into the ground outside the saucer. The stakes shall be equally spaced. The tree will be secured to the stakes by canvas or cloth straps around the first lateral branch. The straps should have a maximum of 1/2 inch (13 mm) slack. Do not have taut. Remove after one year, at time of final inspection, provided that trees are in acceptable free-standing condition. See detail.

3.10 PRUNING

- A. The brushed or broken parts of large or fleshy roots shall be cut off smooth before planting. Evergreen plants shall not be pruned except to remove dead or broken branches. Deciduous plants shall be pruned using proper pruning practices as approved by a certified arborist.
- B. Trees and shrubs that have been so badly pruned as to spoil their form and usefulness shall be removed and replaced.

3.11 INSPECTION

- A. Scheduling: In addition to the normal progress inspections, schedule and conduct the following formal inspections, giving the Landscape Architect at least 48 hours prior notice of readiness for inspection.
 - 1. Inspection of plants in containers prior to planting.
 - 2. Inspection of plant locations, to verify compliance with the plans.
 - 3. Substantial completion inspection after completion of planting. Schedule the substantial completion inspection sufficiently in advance, and in cooperation with the Landscape Architect so that final inspection may be conducted within 24 hours after completion of planting.
 - 4. Final inspection at the end of the maintenance period, provided that all previous deficiencies have been corrected.

3.12 MAINTENANCE

- A. General: Maintain all planting, starting with the delivery or collection of plant materials and continuing until completion of job. Maintenance shall include all watering, weeding, cultivating, spraying, and pruning necessary to keep the plant materials in a healthy growing condition and to keep the planted areas neat and attractive throughout the maintenance period. Provide all equipment and means for proper application of water. Protect all planted areas against damage, including erosion and trespassing, by providing and maintaining prior safeguards.
- B. Settlement: If any tree, shrub, or plant bed settles more than 1 inch (2.54 cm) below the established grade, the plant shall be raised to the proper level and not merely covered with additional mulch.
- C. Replacements: At the end of the maintenance period, all plant material shall be in a healthy growing condition. During the maintenance period, should the appearance of any plant indicate weakness and probability of dying, immediately replace the plant with a new and healthy plant of the same type and size without additional cost to the Owner.
- D. Extension: Continue the maintenance period at no additional cost to the Owner until all previously noted deficiencies have been corrected at which time the final

inspection shall be made. When final inspection is made and deficiencies are noted, the maintenance period will continue until such deficiencies are corrected at no additional cost to the Owner.

3.13 GUARANTEE

- A. Time Frame: Guarantee all plant materials to remain healthy and in a vigorous growing condition for a period of 1 year following substantial completion. The final inspection shall be one year from the date of substantial completion.
- B. Replacements: All replacements shall be the same species as originally installed.

END OF SECTION

SECTION 03720

PRECAST CONCRETE LATRINE

PART 1 GENERAL

1. WORK INCLUDED

- A. This section covers the work necessary to furnish and install the Aspen Style precast concrete vault latrine as produced by Missoula Concrete Construction or approved equal.
- B. Work included in this section is as follows:
 - 1. Preparation of building foundation.
 - 2. Provide and place the building.

2. GENERAL

- A. The building shall be provided complete, ready for service with all doors, vents, and appurtenances as indicated in the drawings and this specification.

3. CODES, PERMITS, AND COMPLIANCE

- A. The building shall conform to all requirements of the current editions of the IBC, and all other codes, standards and ordinances applicable to work. In event of conflicts between these specifications and applicable codes or standards, the codes and standards shall govern.

4. SPECIFICATIONS

- ASTM C33 Concrete Aggregates
- ASTM C39 Method of Test for Compressive Strength of Cylindrical Concrete Specimens
- ASTM C143 Method of Test for Slump of Concrete
- ASTM C150 Standard Specification for Portland Cement
- ASTM C192 Method of Making and Curing Test Specimens in the Laboratory
- ACI 1211.1 Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete
- PCI MNL 116 Quality Control for Plants and Production of Precast Prestressed Concrete Products
- AWS D1.1 Structural Welding Code

5. SUBMITTALS

- A. The CONTRACTOR shall provide the following information:
 - 1. Brochures, cut sheets, structural calculations, and a complete set of engineered drawings of the building and concrete test results.
 - 2. Color samples for Owner selection.

6. MANUFACTURER CRITERIA

A. The building manufacturer shall meet the following requirements at a minimum:

1. Manufacturer shall be as follows or an engineer approved equal:

Missoula Concrete Construction
P.O. Box 16086
Missoula, Montana 59808
Phone: 406-549-9682

7. DESIGN CRITERIA

A. The Aspen has been designed to meet the following criteria. Calculations and Engineer's stamped drawings are available upon request by the customer and are for their sole and specific use only. The design criteria are to ensure that the Aspen not only will withstand the forces of nature listed below but to provide protection from vandalism and other unforeseen hazards.

1. Roof Snow Load

- a. The Aspen will withstand a snow load of 250 pounds per square foot.

2. Wind Load

- a. The Aspen will withstand the effects of 120 mile per hour wind load (fastest mile) or 180 mph (3 second-gust) Exposure C.

3. Earthquake

- a. The Aspen will withstand the effects of a zone 4 earthquake.

4. Additional Design Standards

- a. The Aspen is designed to meet the requirements of the Americans with Disabilities Act Requirements and Uniform Federal Accessibility Standard including as of the date of these specifications.
 - b. The Aspen incorporates all design aspects of Sweet Smelling Technology as outlined by Brian Cook for the U.S. Forest Service. ("In Depth Design and Maintenance Manual for Vault Toilets" - July 1991 - Publication No. 9123 1601)
 - c. The Aspen has a one-piece vault unit to support the building, screen area and snow loads evenly. The Aspen has a one piece prestressed floor unit with a 250 psf load capacity to withstand transportation stresses.

5. Tolerances

- a. Tolerances will be within the limits as dictated by the PCI Quality Control and Assurance Manual.

8. WARRANTY

- A. A one year manufacturer's warranty is required against defects and workmanship for all components of the building. In addition all concrete components shall carry a warranty of 20 years. The warranty period shall begin on the date of substantial completion.

PART 2 MATERIALS

1. GENERAL

- A. Concrete: The concrete mix design will be designed to ACI 211.1 to produce concrete of good workability.

Mix #7.25 R - 1 cubic yard
cement 681 lbs.
water 232 lbs. (27.8 gal.)
w/c=.34
Course aggregate (SSD) 1,800 lbs.
Fine aggregate (SSD) 1,196 lbs.
Water Reducing Agent 34 oz. MB 322N
Air Entraining Agent 6 oz. MB AE-90 (4-7%)
Ave. 28 day strength 5,500 psi

1. Cement will be low alkali type I-II or type III conforming to ASTM C-150.
2. Coarse aggregates used in the concrete mix design will conform to ASTM C33 with the designated size of coarse aggregate #67.
3. Minimum water/cement ratio will not exceed 0.40. Slump will not exceed 5" with normal water reducing agent or 7" with super plasticizer.
4. Air-entrained admixtures will conform to ASTM C260. Water reducing admixtures will conform to ASTM C494, Type A. Plasticizing admixtures will conform to ASTM C 1017. Other admixtures will not be used without customer approval.

B. Colored Concrete

1. Color additive will conform to ASTM C979. A 6-inch x 12-inch x 2-inch color sample shall be made available for customer approval.
2. The following will contain colored concrete:
 - a. Toilet building roof panels
 - b. Building walls
 - c. Screen panels
 - d. The sample brand and type of color additive shall be used throughout the

manufacturing process.

- e. All ingredients will be weighed and the mixing operation will be adequate to ensure uniform dispersion of the color.
3. Color pigments will be by Davis Colors.

C. Cold Weather Concrete

1. Cold weather concrete placement will be in accordance with ACI 306.
2. Concrete will not be placed if ambient temperature is expected to be below 35 degrees Fahrenheit during the curing period unless heat is readily available to maintain the surface temperature of the concrete at least 45 degrees F.
3. Materials containing frost or lumps of frozen materials shall not be used.

D. Hot Weather Concrete

1. The temperature of the concrete will not exceed 80 degrees Fahrenheit at the time of placement and when the ambient temperature reaches 90 degrees Fahrenheit, the concrete shall be protected with moist covering.

E. Concrete Reinforcement

1. All reinforcing steel will conform to ASTM A615. All welded wire fabric shall conform to ASTM A185.
2. All reinforcement will be new, free of dirt, oil, paint, grease, loose mill scale and loose or thick rust when placed.
3. Details not shown on drawings or specified will be to ACI 318.
4. Steel reinforcement shall be centered in the cross-sectional area of the walls and will have at least 1-inch of cover on the under surface of the floor and roof.
5. The maximum allowable variation for center-center spacing of reinforcing steel will be 1/2-inch.
6. Full lengths of reinforcing steel shall be used when possible.
7. Reinforcing bars will be bent cold.
8. Diagonal reinforcement will be placed around all openings.

F. Sealers and Curing Compounds

1. Curing compounds, if used, shall be colorless, complying with ASTM C309, type I or I-D.
2. Weatherproofing sealer for exterior of building shall be clear, low gloss, water based acrylic sealer (Dayton-Superior J-24).

G. Caulking, Grout, Adhesive and Sealer

1. All caulking shall remain flexible and non-sag at temperatures from -50 to 140 degrees Fahrenheit.
2. Interior joints will be caulked with white "Sidewinder" by DAP.
3. Exterior joints will be caulked with a siliconized acrylic caulk that closely matches the exterior concrete color (by GE Sealants). Roof ridge will be 100% silicon caulk (also by GE Sealants).
4. Epoxy concrete adhesive will be two component rigid, non-sag gel adhesive for bonding to dry or damp surfaces, moisture insensitive.
5. Portland cement mortar shall consist of one part Portland cement, three parts sand and enough water to make a workable mixture.

H. Paint

1. All paints and materials shall conform to all Federal specifications or be similar "top-of-the-line-components". Paints will be lead free.
2. Type of paints for buildings:
 - a. Inside concrete surfaces
 - 1) Interior floors shall be a two-part water based epoxy (AQUA TILE by INSL-X). The color shall be gray.
 - 2) Interior walls and ceilings 100% acrylic emulsion, Mirrorlac-WB DP84XX by DEVOE / GLIDDEN. The color shall be white.
 - b. Metal surfaces both inside and out
 - 1) Primer and enamel - Mirrorlac DP85XX by DEVOE / GLIDDEN
 - c. Exterior concrete surfaces
 - 1) Exterior slab shall be clear sealer.
 - 2) Exterior walls shall be a pure acrylic water repellent penetrating stain in the same color as the walls followed by a clear acrylic sealer. Stain enhanced with Wondershield by DEVOE / GLIDDEN. DR15XX
 - 3) Simulated shake roofs shall receive one heavy coat of pure linseed oil.

I. Grab bars

1. Grab bars will be 18 gauge, type 304 stainless steel with 1-1/2" clearance. Grab bars will each be able to withstand 300 pounds of loading.

J. Toilet Paper Dispenser

1. Dispenser will be constructed of 1/4" thick steel with an enamel finish. Dispenser will be capable of holding three (3) standard rolls of toilet paper. Toilet paper holder fastening system will be able to withstand 300 pound top loading.

K. Toilet Riser

1. Toilet riser will be 18" high, white cross linked polyethylene, with heavy duty seat and lid, manufactured by Romtec, Roseburg, OR.

L. Steel Doors

1. Doors will be flush panel type 1-3/4-inch thick, minimum 16 gauge prime coated steel panels level 3 Extra Heavy-duty, by Ceco Door Products.
2. Door frames will be knockdown or welded type, single rabbet, minimum 16-gauge prime coated steel, width to suit wall thickness. Three (3) rubber door silencers will be provided on latch side of frame.

M. Door Hinges

1. Door hinges will be 3 per door with dull chrome plating 4-1/2-inch x 4-1/2-inch, adjustable tension, automatic-closing for each door.

N. Lockset

1. Lockset will meet ANSI A1 56.2 Series 4000, Grade 1 cylindrical lockset for exterior doors.
2. Lever handle both inside and out.
3. Either handle operates latch unless outside handle is locked by inside push-button.
4. Push-button will automatically release when inside lever handle is turned or door is closed.
5. Emergency slot on exterior so door can be unlocked from the outside with a coin, screwdriver, and etc.
6. Inside lever always active.
7. U.S. 26D finish

O. Door or Wall Louvers

1. Door louver will be fixed, inverted split Y, non-vision, 18 gauge cold rolled steel with a factory prime coat equal to FDLS series.
2. Wall louver (if requested) will be HEAVY DUTY KICK PROOF VENT by Romtec, Roseburg, OR.

P. Doorstop

1. Door stop will have a cast metal base, U.S. 26D finish with gray rubber 2-3/8" diameter bumper with a 1" projection.

Q. Double Coat Hook

1. Coat hooks will be constructed of solid brass with a brushed chrome finish. Hooks will be side by side "ram horn" style with minimal projection for safety.

- R. Door Sweep
 - 1. Door sweep will be provided at the bottom of door and will be an adjustable brush type.
- S. Windows and Vault Cleanout Cover
 - A. Windows and cleanout cover frames will be constructed from steel.
 - B. Window glazing will be 1/4" thick LEXAN polycarbonate.
 - C. Plate for vault cleanout cover will be 1/4" thick diamond plate steel. Lid will be configured so that it can be locked with a padlock. Lid will be designed to resist surface runoff penetration into the vault. A neoprene gasket will be provided around the entire perimeter of the lid to provide an airtight seal.
- T. Vault Liner
 - 1. The vault shall include a one-piece 0.187" thick LDPE plastic liner by RMI Manufacturing, Caldwell, ID. Vaults with the LDPE liner shall be warranted against leaks for a period of 7 years.

PART 3 BUILDING MANUFACTURING

1. GENERAL

A. Mixing and Delivery of Concrete

- 1. Mixing and delivery of concrete shall be in accordance with ASTM C94, section 10.6 through 10.9 with the following additions.
 - a. Aggregate and water shall be adjusted to compensate for differences in the saturated surface-dry conditions.
 - b. Concrete shall be discharged as soon as possible after mixing is complete. This time shall not exceed 30 minutes.

B. Placing and Consolidating Concrete

- 1. Concrete shall be consolidated by the use of mechanical vibrators. Vibrators shall be sufficient to accomplish compaction but not to the point that segregation occurs.

C. Finishing Concrete

- 1. Interior floor and exterior slabs shall be floated and troweled until all marks are removed. A light broom finish shall be applied to the exterior and interior slabs for a non-slip finish.
- 2. All exterior building walls and exterior screen walls shall be a barnwood texture, unless otherwise specified.
- 3. All exterior surfaces of the roof panels shall be cast to simulate a cedar shake roof, unless otherwise specified. The underside of the overhang shall have a smooth finish.

D. Cracks and Patching

1. Cracks in concrete components which are judged to affect the structural integrity of the building will be rejected.
2. Small holes, depressions and air voids shall be patched with a suitable material. The patch shall match the color, finish and texture of the surrounding surface.
3. Patching shall not be allowed on defective areas if the structural integrity of the building is affected.

E. Curing and Hardening Concrete

1. Concrete surfaces shall not be allowed to dry out from exposure to hot, dry weather during initial curing period.
2. Curing compounds will not be used on interior walls as they will prevent paint adhesion.

PART 4 FINISHING AND FABRICATION

1. GENERAL

A. Structural Joints

1. All welding will be by Certified Welders only (in accordance with AWS D1.1).
2. Wall components will be joined together with 2 welded plate pairs at each joint. Weld plates will be anchored into the concrete panels and welded together with a continuous weld.
3. Walls and roof will be joined with weld plates, 2-1/2" x 5", at each building corner.
4. The joint between the floor slab and walls will be joined with a grout mixture on the inside. a matching colored caulk on the outside and two weld plates 6" long per wall.

B. Painting

1. An appropriate curing time shall be allowed before paint is applied to concrete.
2. Some applications may require acid etching. A 30% solution of hydrochloric acid shall be used, flushed with water and allowed to thoroughly air dry.
3. Painting shall not be done outside in cold, frosty or damp weather.
4. Painting shall not be done outside in winter unless the temperature is 50 degrees Fahrenheit or higher.
5. Painting shall not be done in dusty areas.

6. Schedule of finishes:
 - a. Inside Concrete Surfaces
 - 1) Inside floors shall be 2 coats of 2-part water based epoxy.
 - 2) Interior walls and ceilings shall be one coat primer/filler and 2 coats of white water based acrylic emulsion.
 - b. Metal Surfaces both Inside and Out
 - 1) 1 coat primer and 2 coats of enamel
 - c. Exterior Concrete Surfaces
 - 1) Exterior slab shall be 1 coat of clear sealer.
 - 2) Stained enhanced exterior walls shall be 1 coat of pure acrylic water repellent penetrating stain in the same color as the walls or roof followed by 1 coat of clear acrylic sealer.

PART 5 QUALITY CONTROL AND INSPECTION

1. GENERAL

A. Pre-pour inspection.

1. Check all panel measurements including diagonals (must be within 1/4 inch).
2. Check rebar spacing and clearance
3. Check location of all embeds.

B. Concrete Testing

1. The following tests will be performed on concrete used in the manufacture of toilets. Testing will only be performed by qualified individuals who have been certified ACI Technician Grade 1. Sampling will be in accordance with ASTM C172.
 - a. The slump of the concrete will be performed on the first batch of concrete in accordance with ASTM C143. This slump will be in the 3"-5" range.
 - b. The air content of the concrete will be checked per ASTM C231 on the first batch of concrete. The air content will be in the range of 4%-6%.
 - c. The compressive strength of the cylinders will be tested to ASTM C39.
 - d. Test cylinders will be taken from every other batch.
 - 1) 1 cylinder will be tested prior to removal of forms and must be at 2,500 psi or higher.

- 2) 1 cylinder represents 7 day strength
- 3) 2 cylinders will represent 28 day strength and must be 4,500 psi or greater.

C. After Form Removal Inspection

1. Recheck panel dimensions
2. Verify that all embeds remained in place.
3. Look for all cracks or blemishes that may cause rejection.
4. Assure that panels are properly yarded and blocked.

PART 6 INSTALLATION

1. GENERAL

A. Work specified under this section includes excavation, backfill and placement of precast concrete vault toilet.

B. Materials

1. Bedding material to be sand or 3/8" minus crushed or screened aggregate.
2. Sealant between vault and toilet floor to be 1"x1" Butyl Rubber Sealant.

C. Location and Access to the Site

1. It is the responsibility of the customer to locate the vault toilet in area that provides safe and reasonable access for trucks and equipment.
 - a. The area must be free of overhead or underground obstructions.
 - b. Care must be taken to not place excavated material in the area where the crane must sit.
 - c. Verify that bridges/culverts enroute to the site are rated for HS-20 loading.
 - d. Deliveries may be delayed if road conditions are hazardous or unsuitable for normal trucks and trailers.
 - e. Trucks must be able to reach the site under their own power.

D. Excavation and Elevation

1. Comply with all applicable OSHA Standards for excavation.
2. The "Aspen" vault toilet requires a hole that is 8ft wide and 16ft long as measured at the bottom. Depth should be 4'-9" below desired finished floor elevation.
3. Finish floor elevation will be 4-6 inches above natural grade measured at the front

(entrance) of the exterior slab unless otherwise approved by the customer. The customer may specify a finish floor elevation for buildings at some sites. The contractor will install buildings at these sites with floor elevation within ± 0.05 feet of the specified floor elevation. It is very important that the installation provides drainage away from the structure.

E. Bedding and Compaction

1. Compact the natural ground at the bottom of the vault excavation with a minimum of three passes with a whacker-type mechanical compactor or equivalent approved by the customer.
2. Install sand or aggregate bedding material for leveling course. Compact leveling course with one pass with a whacker-type mechanical tamper or equivalent approved by the customer. Grade leveling course so there will be no high spots in the middle of the vault bottom. Compact with a second pass with a whacker or approved equivalent tamper.
3. Set vault in place. Backfill around structure. Use excavation material for backfill except that rocks larger than six inches in maximum dimensions shall not be placed within six inches of the exterior vault walls.
4. Fill, adjacent to the building entry, will have excavated material placed in eight inch loose lifts and compacted with a minimum of two passes with a whacker-type mechanical compactor or equivalent approved by the customer.

F. Finish Grading

1. Spread excess excavated material from the vault around structure. Intended final grade is flush with the top of the front slab. Allow for placement of topsoil to reach that grade. Grade backfill away from structure from structure at maximum slope of five (5) percent unless otherwise approved by the customer.
2. Spread stockpiled topsoil as final layer after rough grading is completed. Areas disturbed by excavation, backfilling and stockpiling of excavated materials will be handed raked to remove exposed rocks over one inch in maximum dimension. Oversized rocks removed from the surface shall be disposed of in a designated area within 200 feet of the site.

G. Vault Toilet Riser and Accessories

1. Apply Butyl rubber adhesive sealant to the top surface of the concrete vault before placing the structure on the vault.

H. Exhaust Pipe Installation

1. After exhaust pipe is installed, seal around pipe at top and underside of roof with silicone caulk. Seal around pipe at top of slab will be accomplished by using silicone caulk.

END OF SECTION

SECTION 11750

WATER SYSTEM COMPONENTS

PART 1 GENERAL

1. WORK INCLUDED

- A. This specification covers the provision and installation of a new submersible pump and controls. This pump will pressurize the water system.
- B. See also the Plumbing Section of these Specifications for domestic water piping and appurtenance requirements of the domestic water system
- C. See also the Electrical Section of these Specifications for primary power, wiring, and disconnect requirements for the new well pump.
- D. See also the General Equipment Stipulations Section of these Specifications for other requirements of the new well pump, motor, and controls.

2. SUBMITTALS

- A. Submittals for the well pump, motor, and controls shall conform to the requirements of the General Equipment Stipulations Section of these Specifications.
- B. Submittal data for the new pump shall include:
 - 1. Pump performance curve showing flow, TDH, horsepower demand, pump efficiency, and including shutoff head and manufacturer's recommended maximum head-capacity condition for operation.
 - 2. Manufacturer's suction requirements for pump.
 - 3. Cut-away drawing showing pump assembly and components.
 - 4. Dimensional drawing showing pump configuration, overall length, point of water intake, and discharge pipe connection size and location.
 - 5. Materials of construction for all pump components.
 - 6. Pump motor electrical characteristics, horsepower, and service factor.
 - 7. Pump motor electrical connection and required power cable details and materials.
 - 8. Pump motor construction materials and insulation.
 - 9. Electrical characteristics and ratings, manufacturer's specifications, installation/adjustment instructions, and dimensions and mounting requirements for pressure switch, pump control box (including magnetic starter and heaters), and lightning arrestor. Also required is written statement from pump manufacturer/vendor for compatibility of controls for use with pump.

10. Manufacturer's O&M Manual for pump, including Installation Instructions.
 11. Manufacturer's statement of Warranty for pump and motor.
 12. Address and phone number of nearest manufacturer's certified service center for pump and motor.
- C. References herein to manufacturer's name and model for pumps, motors, and controls are intended to establish a level of quality for those items. Products of alternate manufacturers will be considered, subject to compliance with the specification requirements herein and the requirements for Submittal review.

3. ELECTRICAL

1. Pump motor, controls, and wiring shall be in full accordance with the NEC and the requirements of the Electrical Section of these Specifications. Consult Electrical Drawings for primary power and disconnect requirements and locations for pump and control equipment.

PART 2 MATERIALS

1. GENERAL

- A. Pump and motor shall be furnished complete with all accessories and appurtenances for a complete and functional installation, including motor leads, connectors, and cabling.
- B. The pump and motor manufacturer's standard lightning arrestor shall be provided with the equipment.

2. SUPPLY PUMP AND MOTOR CHARACTERISTICS

- A. New submersible pump and motor shall meet the following operating conditions:

- | | |
|-----------------------------|-------------------|
| 1. Ground surface elevation | 4267' MSL |
| 2. Max Water temperature | 104 degrees F |
| 3. Static Lift | 30-110 feet |
| 4. Design flow rate at TDH | 6 gpm at 200' TDH |
| 5. Rotating Speed | 3450 rpm |
| 6. Stages | 13 |
| 7. Motor Horsepower | 0.5 Hp |

8. Motor Service Factor 1.60
 9. Motor electrical characteristics 230 VAC, 60Hz, 1-phase
 10. Pump certifications NSF standard 61, UL 778 listed
- B. Pump and motor materials shall comply with the following:
1. Impellers
 2. Motor certification
 3. Pump and motor warranty
- C. Pump and motor configuration shall meeting following:
1. The pump shall be Grundfos model 5S05-13 60 Hz with MS402 motor or equal.
- D. Hydropneumatic Tank
1. Hydropneumatic tank shall be a vertical cylindrical tank with integral polyethylene liner and butyl rubber diaphragm. Tank shall be pre-charged to a pressure of 36 psi. Tank shall have a nominal volume of 79.6 gallons with a maximum drawdown of 20.7 gallons (at 40/60 psi working pressure); tank dimensions shall be a maximum of 26-inch diameter and 64-inch height; tank shall have a 1 1/4-inch NPT threaded connection; tank shall be designed for a working pressure of 125 psi. Tanks must meet ASME code requirements or must satisfactorily pass a hydrostatic test of one and one-half (1.5) times the maximum allowable working pressure of the tank as marked on the tank. Tanks shall be Well Mate WM-23 or approved equal.
- E. Pressure Switch:
1. Pump shall include an integral pressure switch adjustable over a standard 40 to 60 psi range, with a maximum cut-out of 80 psi. Pressure switch shall have a 1/4" FIPT connection, and shall be furnished with a stainless steel 1/4" quarter-turn isolation ball valve. Pressure switch shall be 230V, 1-phase, and shall be *CentriPro AS4* as manufactured by *SquareD*, or equal.

END OF SECTION

SECTION 15200

PLUMBING

PART 1 GENERAL

1. WORK INCLUDED

A. This section covers the work necessary to furnish and install piping, fixtures, appliances, equipment, and appurtenances for complete and functional plumbing systems as indicated in the Drawings and specified herein.

B. Work included in this section is as follows:

1. Piping and valves for both indoor and outdoor buried service.

2. GENERAL

A. The drawings do not show all details of all piping systems, and instead only portray the functionality required. The CONTRACTOR shall provide all accessories, adapters, appurtenances and supports to achieve a complete and functional installation. The CONTRACTOR shall verify all piping routings and locating dimensions shown for conflicts with other piping or utilities, and shall provide any offsets required to achieve clearance at no additional cost to the OWNER. In the event changes to the locations of equipment or piping shown are necessary, the CONTRACTOR shall submit such changes in writing to the ENGINEER before proceeding with such changes.

B. All fixtures and appliances shall be installed in complete accordance with the manufacturer's recommendations and requirements, including structural support and venting.

C. Manufacturers' references are included herein for reference and to establish the required level of quality; "or equal" products may be proposed subject to the requirements for Submittal review.

3. CODES, PERMITS AND COMPLIANCE

A. Plumbing under these Specifications shall conform to all requirements of the current editions of the UPC, IBC, UFC, DEQ Circulars and all other codes, standards and ordinances applicable to work. In event of conflicts between these Specifications and applicable codes or standards, the codes and standards shall govern.

B. All piping, fixtures, and accessories shall be installed in strict accordance with the laws and regulations of the State of Montana and Carbon County.

C. Any permits legally required for the work under these Specifications shall be the responsibility of the CONTRACTOR to obtain. Costs of such permits and scheduling of any inspections required in conjunction with such permits or associated requirements shall be the responsibility of the CONTRACTOR.

- D. Completed piping systems shall be tested by the CONTRACTOR in accordance with all applicable codes and standards before charging such piping.

4. SUBMITTALS

- A. The CONTRACTOR shall provide the following information:

1. Fixtures and Appliances: Provide manufacturers' catalog information, photographs, material and component specifications, fully dimensioned drawings, weight, support requirements, storage and installation instructions, and operating manual.
2. Exposed Piping Systems: Provide manufacturers' catalog information, material specifications, dimensions, and ratings.
3. Pipe Fittings and Appurtenances: Provide manufacturers' catalog information, material specifications, dimensions and ratings.
4. Buried Piping Systems: Provide manufacturers' catalog information, material specifications, dimensions, and ratings.
5. Pipe Supports: Provide manufacturers' catalog information, material specifications, dimensions, load ratings, recommended spacing, and types and arrangement of fasteners, including substrate requirements.

PART 2 PRODUCTS

1. GENERAL

- A. Like items of material provided under these Specifications shall be the product of one manufacturer.

2. GALVANIZED STEEL PIPE AND FITTINGS

- A. Galvanized steel piping for the Utility Building and shall be carbon steel, Schedule 40, meeting ASTM A120, ASTM A53 Grade B, or ASTM A106 Grade B.
- B. Galvanized steel pipe fittings and joints shall be screwed. Fittings shall be Schedule 40, galvanized, meeting ASTM A196 or ASTM A47. Fitting dimensions shall conform to ANSI B16.3. Unions shall be 300-pound malleable iron, galvanized, with brass to iron seats.
- C. Thread lubricant for galvanized steel pipe shall be Teflon tape or joint compound insoluble in water.

3. PLUMBING PIPE SUPPORTS AND ACCESSORIES

- A. Wall-mounted pipe supports for lines 1 1/2-inch and smaller shall be one-hole, clamp type, and shall be *Anvil/Grinnell Figure 126*, or ENGINEER approved equal.

- B. Wall-mounted pipe supports for lines larger than 1 1/2-inch shall be welded steel, heavy duty clamp type, and shall be *Anvil/Grinnell Figure 199*, or ENGINEER approved equal.
- C. Hanger pipe supports shall be cradle type with hanger rods and clevises, and shall be *Anvil/Grinnell Figure 104 or Figure 260*, or ENGINEER approved equal.
- D. Floor Mounted Pipe Supports shall be offset clamp type, and shall be *Anvil/Grinnell Figure 103*, or ENGINEER approved equal. If required a section of structural steel channel or tubing may be used to vertically adjust the height of the support. The structural steel shall be anchored to the floor using 1/4-inch stainless steel anchor bolts.
- E. Fasteners for pipe clamps and hangers shall be as recommended by the support manufacturer, and shall be suitable for proper anchorage to the substrate material to which attached. Fasteners shall be galvanized steel.

4. HDPE PIPE AND FITTINGS FOR BURIED SERVICE

- A. High density polyethylene pipe (HDPE) for buried domestic water well supply and yard piping shall be NSF listed. HDPE pipe shall be iron pipe size with 200 psi pressure rating at 73.4 degrees F. Pipe shall have an SDR of 11, based on inside diameter controlled dimensions. Pipe shall meet ASTM D2239 and AWWA C901. HDPE pipe shall be formulated from 4710 polyethylene resin, and extruded. The exterior of HDPE pipe shall be permanently marked with size, SDR, operating pressure, date of manufacture, and NSF logo. Pipe shall have a 25-year warranty from the manufacturer, and shall be *JM Eagle PE 4710*, or ENGINEER approved equal.
- B. Fittings for buried HDPE piping shall be gray Schedule 80 PVC with insert-by-insert or insert-by-NPT ends. Each insert connection shall each be secured with dual 1/2" minimum width stainless steel hose clamps meeting pipe and fitting manufacturers' recommendations.

5. CURB VALVES-WATER SERVICE

- A. Curb valve for buried water service shall be brass ball valves with compression connections suitable for use with HDPE pipe and Minneapolis pattern top threads. Valves shall be rated 300-pound WOG, and shall meet the requirements of AWWA C800. Valves shall be *Mueller B-25211 ball curb valve*, or ENGINEER approved equal.
- B. Curb boxes shall be cast iron construction, Minneapolis pattern, and allow height adjustment between 78 and 66-inches. The curb box shall include a lid with plug. Curb boxes shall be *Mueller H-10300* or ENGINEER approved equal. Two keys will be provided to the Owner for opening and closing the valves.

6. STOP/DRAIN VALVES- WATER SERVICE

- A. Curb valve for buried water service shall be brass ball valves with compression connections suitable for use with HDPE pipe and Minneapolis pattern top threads.

Valves shall be rated 300-pound WOG, and shall meet the requirements of AWWA C800. Valves shall be *Mueller B-10288 drain valve*, or ENGINEER approved equal.

- B. Curb boxes shall be cast iron construction, Minneapolis pattern, and allow height adjustment between 78 and 66-inches. The curb box shall include a lid with plug. Curb boxes shall be *Mueller H-10300* or ENGINEER approved equal.

7. ADA HYDRANTS

- A. Yard hydrants shall be post-type hydrants with ADA operating lever and riser suitable for 7-foot bury depth. The hydrant will include a separate diverter spout and hose connection with a double check backflow preventer. Hydrants shall include a reservoir to store water below the frost line between uses to prevent freezing. Hydrants shall meet ADA requirements for height and hydrant operating force. ADA hydrants shall be *Woodford model S4H*, or ENGINEER approved equal.

8. PRESSURE GAUGE

- A. Gauges shall be Bourdon tube type actuated pressure gauges. Gauges shall be stem mounted with 2-1/2-inch dial face size, unless otherwise noted. Scale range shall be 0 to 100 psi and accuracy shall be plus or minus 3 percent of span.
- B. The sensing element shall be phosphor-bronze, unless otherwise noted. Gauge casings shall be stainless steel.
- C. Gauges shall be as *Ashcroft 1008A/AL* or an ENGINEER approved equal.

9. WOODFORD THERMALINE

- A. Water connector for camp host site shall be Woodford Manufacturing Co. Thermaline 3-foot bury, with 15 watt portable insert heater, bonded polyurethane insulation, sanitary tight-line design.

PART 3 EXECUTION

1. GENERAL

- A. All plumbing and installation of piping, appurtenances, and fixtures shall fully conform to the current edition of the *Uniform Plumbing Code (UPC)*, and all applicable state and local regulations. All work shall be approved by the State Plumbing Inspector.
- B. Drawings do not attempt to show the exact details of all piping. No extra payment will be allowed for fittings, adapters, appurtenances, clearances or offsets required to complete the Work. Changes in locations of equipment or piping, contemplated by the CONTRACTOR, must be submitted to the ENGINEER in writing, and cannot be executed without the ENGINEER'S approval. All work shall be completed to provide a fully functional installation as shown and specified.
- C. Unions shall be provided in piping systems where shown, and adjacent fixtures and appliances where necessary to assure proper alignment without stressing piping members

of fixture connections. Insulating (dielectric) unions shall be provided on domestic hot and cold water piping at all connections between steel and copper (or brass) piping and for all connections to electrically powered appliances.

- D. Plumbing fixtures shall be plumbed, trapped, and vented as required by UPC, and as shown. In the event of conflicts between the plumbing requirements shown and UPC, requirements of the Code shall take precedence.

2. PIPING

- A. Piping runs shall be level and plumb, except where slopes are specifically called or shown.
- B. Pipes shall be adequately supported by clamps or hangers at intervals not to exceed 10-feet, and either side of all changes in direction. Where additional supports may be needed to provide pipe stability, they shall be provided at no additional cost.
- C. All piping intended to carry potable water shall be disinfected before placing into service. Disinfection procedures shall conform to AWWA C651.
- D. All piping systems installed under this section do not require painting or coating.
- E. Buried HDPE yard piping and fittings for domestic water service shall be installed in accordance with AWWA C901 and ASTM D2774. A minimum of 6-inch of pipe bedding shall be placed on all sides of buried HDPE hard piping.

3. YARD HYDRANTS

- A. Yard hydrants shall be plumbed and adjusted to 34-inch height above grade. Yard hydrant connections shall utilize insert-by-IPT (male) adapters to connect to HDPE yard piping. Drain ports on yard hydrants shall be provided with a minimum of one cubic foot of 2-inch nominal diameter washed rock, centered on the drain.

4. WOODFORD THERMALINE

- A. Woodford Manufacturing Co. Thermaline freezeless sanitary water connector shall be installed at a bury depth of 3 feet and shall be installed per the manufacturer installation instructions.

5. TESTING

- A. Completed cold water piping, including fixture connections shall be tested and demonstrated to be leak free by the CONTRACTOR by charging with water and maintaining 60 psi pressure, in the presence of the ENGINEER. Any leaks or defects shown shall be promptly remedied by the CONTRACTOR.
- B. Other tests of completed piping as prescribed by the UPC shall also fully apply, and shall be conducted in the presence of the ENGINEER.

END OF SECTION

SECTION 15210
PUMP HOUSE BUILDING

PART 1 GENERAL

1. WORK INCLUDED

- A. This section covers the work necessary to furnish and install the pump house utility building.
- B. Work included in this section is as follows:
 - 1. Preparation of building foundation.
 - 2. Provide and place the building.

2. GENERAL

- A. The building shall be provided complete, ready for service with all doors, vents, and appurtenances as indicated in the drawings and this specification.

3. CODES, PERMITS, AND COMPLIANCE

- A. The building shall conform to all requirements of the current editions of the IBC, and all other codes, standards and ordinances applicable to work. In event of conflicts between these specifications and applicable codes or standards, the codes and standards shall govern.

4. SPECIFICATIONS

- A. Excavation and Site Preparation
 - 1. Contractor will clear and grub site and install a base course material of compacted pit run gravel.
 - 2. Contractor will excavate for slab footings and provide a 4" course of compacted ¾" crushed gravel or washed gravel under the slab.
 - 3. Contractor will verify the finished elevation of the slab with the owner.
- B. Foundation – refer to plan details.
 - 1. Footing Reinforcement - #4, 40 ksi steel reinforcing bars are to be installed accurately and held securely in place.
 - a. Minimum splice lap = 24"
 - b. Continuous at corners for 24" in each direction
 - c. Minimum coverage of concrete = 2"
 - 2. Slab Reinforcement - #4, 40ksi steel reinforcing bars are to be installed accurately and held securely in place.
 - a. Minimum lap splice = 12"
 - b. 12" vertical leg extending into slab footing will be one continuous section for 4' into slab
 - c. Slab reinforcement is located in the center of the 4" slab (2" wire chairs are recommended).
 - d. Control Joints may be tooled or cut into the slab ¼" wide and 1" deep. Locate as shown on the foundation plan.

- e. The curb and slab may be completed in separate installations at the discretion of the contractor. If the contractor chooses to complete the curb separately, the following specifications are required:
 - Anchor bolts must be set into the slab.
 - A 1/2" bead of gray elastomeric sealant placed at the base of the curb after the concrete is fully cured.
 - Slab surface finished "rough" in areas where curb is installed, and surface kept free of oil and debris.
 - Curb must be placed within (2) days of the slab.
 3. Concrete
 - a. 5 1/2 sack mix,
 - b. minimum 4000 psi, (submit mix design to the project manager 10 days prior to installing concrete).
- C. Anchor Bolts
1. Maximum spacing = 48" o.c.
 2. An anchor bolt must be located 12" from end of sill plates and corners
 3. Minimum of 2 anchor bolts for each section of sill plate.
 - a. Anchor bolts must be set into slab footing
 - b. Align location of bolts with framing
- D. Framing
1. Sill seal – installed continuously between concrete and treated sill plate.
 2. Framing
 - a. Studs - 2x4 at 16" o.c.
 - b. Headers
 - All openings will have 2 jack studs (trimmers) and two king studs.
 - Door and window headers shall be (2) 2" x 8"
 - c. Standard Nailing – minimum 10d nails
 - d. Roof Framing
 - Simpson H1 metal ties at wall
 - Blocking and bracing to be installed as shown
 - e. Roof Sheeting - edge clips installed between trusses, sheeting attached with 8d nails spaced 6" on the edges and 8" in the field.
 - f. Wall Sheeting
 - Laid horizontally and attached to framing with 8d nails spaced 6" on edges and 8" in the field.
 - The shear wall panels indicated on the elevation drawings shall have all panel edges blocked and nailed with 8d nails spaced at 6" on the edges and 8" in the field.
- E. Roofing – installed to manufacturers specifications
- F. Exterior Wall Wrap – use Dupont Tyvek or similar product installed to manufacturers specifications. (submit product information to project manager before installation)

- G. Siding - installed to manufacturers specifications
 - 1. Siding shall be cement board lap siding
 - 2. Caulk all joints with 30 year latex caulk between siding and door trim, siding and soffit, soffit and fascia.
 - 3. Install molding and flashing included in material package
- H. Doors - installed to manufacturers specifications
 - 1. Refer to manufacturer for rough openings (coordinate rough openings with blockouts in the foundation curb)
 - 2. Verify the locations of the doors and windows with the owner.

5. SUBMITTALS

- A. The CONTRACTOR shall provide the following information:
 - 1. Brochures, cut sheets, and material list.
 - 2. Color samples for Owner selection.

END OF SECTION

SECTION 16000

ELECTRICAL GENERAL REQUIREMENTS

PART 1: GENERAL

1.1 ELECTRICAL REQUIREMENTS

- A. The electrical requirements are supplemental to the General and Supplementary Conditions and the General Requirements of these Specifications. The Electrical Sections shall apply to phases of the work specified, shown on the Drawings, or required to provide for the complete installation of Electrical Systems for this project.
- B. The work shall include all items, articles, materials, operations and methods listed, mentioned or scheduled in these specifications and the accompanying drawings. All material, equipment and labor shall be furnished together with all incidental items required by good practice to provide the complete systems described.
- C. Examine and refer to all drawings and specifications for construction conditions which may affect the electrical work. Inspect the building site and existing facilities for verification of present conditions. Make proper provisions for these conditions in performance of the work and cost thereof.

1.2 CODES AND STANDARDS

- A. Work shall meet the requirements of the plans and specifications and shall not be less than the minimum requirements of applicable sections of the latest Codes and Standards of the following organizations:
 - 1. American National Standards Institute (ANSI)
 - 2. Certified Ballast Manufacturers (CBM)
 - 3. Electrical Testing Laboratories (ETL)
 - 4. Independent Testing Laboratories (ITL)
 - 5. International Building Code (IBC)
 - 6. National Electrical Code (NEC) Latest Edition
 - 7. National Electrical Manufacturers Association (NEMA)
 - 8. Underwriters Laboratories (UL)
 - 9. Requirements of the Serving Utility Company
 - 10. Local and State Codes and Ordinances

1.3 FEES AND PERMITS

- A. The electrical contractor shall pay all fees and arrange for all permits required for work done under his contract and under his supervision by subcontract.
- B. Cost of work noted to be by Utility Company shall not be included in Contractor's Bid. All charges made by the Utility Company, if any, for their part of the work will be billed directly to the Owner and paid for by the Owner.

1.4 MATERIALS AND EQUIPMENT

- A. Manufacturer's trade names and catalog numbers listed are intended to indicate the quality of equipment or materials desired. Manufacturers not listed must have prior approval. Written prior approval must be obtained from the Architect/Engineer ten (10) days prior to bid opening. Requests are to be submitted sufficiently ahead of the deadline to give ample time for examination. The items approved will be listed in an addendum and only this list of equipment will be accepted in lieu of specified products. Submittals must indicate the specific item or items to be furnished in lieu of those specified, together with complete technical and comparative data on specified items and proposed items.
- B. Electrical equipment shall be installed with manufacturer's standard finish and color except where specific color, finish or choice is indicated. If the manufacturer has no standard finish, equipment shall have a prime coat and two finish coats of gray enamel.
- C. The electrical contractor shall be responsible for materials and equipment installed under this contract. Contractor shall also be responsible for the protection of materials and equipment of others from damage as a result of his work.
- D. Manufactured material and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer unless herein specified to the contrary.
- E. Materials and equipment shall be stored indoors at the job site or, if this is not possible, stored on raised platforms and protected from the weather by means of waterproof covers. Coverings shall permit circulation of air around the materials to prevent condensation of moisture. Screen or cap openings in equipment to prevent the entry of vermin.

1.5 INTENT OF DRAWINGS

- A. The drawings are partly diagrammatic and do not necessarily show exact location of conduit unless specifically dimensioned. Riser and other diagrams are schematic and do not necessarily show the physical arrangement of the equipment. They shall not be used for obtaining quantities or lineal runs of conduit. Discrepancies shown on different plans, or between plans and actual field conditions shall be brought to the attention of the Engineer for resolution.

1.6 RESPONSIBILITY

- A. The electrical contractor shall be responsible for the installation of satisfactory and complete systems in accordance with the intent of the drawings and specifications and shall provide, at no extra cost, all incidental items required for completion of the work even though they are not specifically mentioned or indicated on the drawings or in the specifications.
- B. The drawings do not attempt to show complete details of the construction which affect the electrical installation; and reference is therefore required to all other project other drawings and specifications and to shop drawings of all trades for additional details which affect the installation of the work covered under this Division of the Contract.
- C. Location of electrical system components shall be checked for conflicts with openings, structural members and components of other systems having fixed locations. In the event of any conflicts, the Engineer shall be consulted and his decision shall govern. Necessary changes shall be made at no additional expense to the Engineer or Owner.
- D. The electrical contractor shall take caution not to install work that connects to equipment until such time as complete Shop Drawings of such equipment have been approved by the Engineer. Any work installed by the Contractor, prior to approval of Shop Drawings, will be at the Contractor's risk.
- E. At all times during the performance of this contract, the electrical contractor shall properly protect work from damage and protect the Owner's property from injury or loss. The contractor shall make good any damage, injury or loss, except such as may be caused by Agents or Employees of the Owner. The electrical contractor shall adequately protect adjacent property as provided by law and the Bidding Documents. The electrical contractor shall provide and maintain passageways, guard fences, lights and other facilities for protection required by Public Authority or Local conditions.

1.7 INSPECTION

- A. All work and material is subject to inspection at any time by the Engineer or his representative. If the Engineer or his representative finds material that does not conform with these specifications or that is not properly installed or finished, correct the deficiencies in a manner satisfactory to the Engineer at no additional expense to the Owner.

1.8 WORKMANSHIP

- A. GENERAL
 - 1. Work under this contract shall be performed by workmen skilled in the particular trade conducting all work necessary to properly complete the installation in a workmanlike manner to present a neat and finished appearance.
- B. EXCAVATION AND BACKFILL

1. Provide all excavating and backfilling as required. Backfill to be free of all debris and decayable matter.

1.9 COORDINATION

- A. The electrical contractor shall plan his work to proceed with a minimum interference with other trades. Dimensions of equipment installed and/or provided by others shall be checked in order that correct clearances and connections may be made.

1.10 CLEAN UP

- A. The electrical contractor shall keep the premises free from accumulation of waste material or rubbish caused by his work or employees.
- B. Upon completion of work, remove materials, scraps and debris relative to his work and leave the premises in clean and orderly condition. Remove all dirt and debris from the interior and exterior of all devices and equipment.

1.11 TEMPORARY FACILITIES

A. OFFICES

1. The electrical contractor shall provide temporary offices for himself including lights, heat and telephone, if required.

B. REMOVAL

1. The electrical contractor shall completely remove his temporary installations when no longer needed and the premises shall be completely clean and restored to match adjacent areas.

C. PROTECTION DEVICES

1. The electrical contractor shall provide and maintain his own necessary barricades, fences, signal lights, etc. required by all governing authorities or shown on the drawings. When no longer needed, they shall be removed by the contractor. The contractor shall assume all responsibility for which the owner may be held responsible because of lack of above items.

D. TEMPORARY WATER

1. The electrical contractor shall provide all water required by his trade for construction. Temporary drinking water shall be provided from a proven safe source dispensed by single service containers.

1.12 SHOP DRAWINGS

- A. Provide eight (8) copies of manufacturer's literature and/or certified prints as soon as possible but within thirty (30) days after awarding of Contract, for items of materials, equipment, or systems where called for in specifications. Shop drawings and literature complete showing item used, size, dimensions, capacity, rough-in, etc., as required for complete check and installation. Manufacturer's literature showing more than one item shall be clearly marked as to which item is being furnished or it will be rejected and returned without review.
- B. Each copy of each item submitted must be clearly marked as follows for purposes of identification and record. Submittals not marked (typewritten only) as described below will be rejected and returned without review.

Date:

Name of Project:

Branch of Work:

Submitted by:

Specification or Plan Reference:

- C. Prior to their submission, each submittal shall be thoroughly checked by the contractor for compliance with the Contract Document requirements, accuracy of dimensions, relationship to the work of other trades, and conformance with sound, safe practices as to erection and installation. Each submittal shall then bear a stamp evidencing such checking and shall show corrections made, if any. Submittals requiring extensive corrections shall be revised before submission. Each submittal not stamped and signed by the contractor evidencing such checking will be rejected and returned without review.
- D. All submittals will be examined when submitted in proper form for compliance. Such review shall not relieve the contractor of responsibility for errors, for deviation from the contract Documents, nor for violation of sound safety practices.
- E. The contractor shall keep in the field office one print of each submittal which has been reviewed and stamped by the Engineer.
- F. Submittals will be required for each item of material and equipment furnished as noted in specifications.
- G. All submittals shall be organized into a single binder and transmitted in one delivery. Transmittal of individual sections is not permitted.
- H. Submittals which are incomplete relative to quality requirements, capacity, engineering data, dimensional data or detailed list of specialty or control equipment will be rejected. Lists shall include descriptive coding as specified or shown on drawings.

I. Schedule of Shop Drawings.

ITEM	MFG LIT	SHOP DWG	WIRING DIAG.	O&M BOOK
WIRE AND CABLE	X			
PEDESTALS	X	X		
PANELBOARDS	X	X		
LIGHTING FIXTURES	X			

1.13 "AS-BUILT" DRAWINGS

- A. The electrical contractor shall furnish to the Owner and Engineer a red line marked print set of drawings, each sheet stamped as the "As-Built" drawing and bearing the contractor's name, date and signature. The As-Built drawing shall show the location of all concealed or underground conduit runs and other equipment, devices, outlets, etc., installed other than as shown on the drawings. Dimension underground lines from established reference points. As-Built drawings to be developed from a job site record drawing set and shall be clean, neat and all changes legible and shown in the same format and symbols used on the contract drawings. The As-Built drawing set shall be submitted to the engineer for approval, and any deficiencies noted by the engineer corrected and resubmitted until approved by the engineer at no cost to engineer or owner.

1.14 GUARANTEE-WARRANTY

- A. The electrical contractor shall and hereby does warrant and guarantee that all work executed under this Division will be free from defects of materials and workmanship for a period of one year from the date of final acceptance of this work and that he will, at his own expense, repair and/or replace all such defective materials and work and all other work damaged thereby which becomes defective during the term of warranty, except that lamps and tubes shall be his responsibility only for normal lamp life or one year, whichever occurs first.

END OF SECTION

SECTION 16110
RACEWAYS AND FITTINGS

PART 1: GENERAL

1.1 APPROVED PRODUCTS:

- A. Electrical Metallic tubing and fittings.
- B. Nonmetallic conduit and fittings.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

- A. National Electrical Code (NEC). Raceways shall be approved for the intended application, and shall meet the requirements of the NEC.

PART 2: PRODUCTS

2.1 GALVANIZED ELECTRICAL METALLIC TUBING (EMT):

- A. Allowed in exterior applications where rain-tight connectors and fittings are used.

2.2 SCHEDULE 40 POLYVINYL CHLORIDE (PVC) CONDUIT:

- A. Allowed for use only underground or below concrete or where rising vertically into equipment.
- B. Not permitted above-ground except where rising directly vertically into equipment.
- C. HDPE may be substituted for PVC. Transition to PVC elbows and conduit where rising above-ground in exposed areas.

2.3 PLASTIC (PVC) CONDUIT AND FITTINGS

- A. Conduit: NEMA TC 2; Schedule 40 and 80 PVC.
- B. Fittings and Conduit Bodies: NEMA TC 3. Per NEC Article 347.
- C. Internal ground conductor required in PVC conduit.

2.4 CONDUIT SUPPORTS

- A. Conduit clamps, straps and supports: Galvanized Steel.

PART 3: EXECUTION

3.1 CONDUIT SIZING, ARRANGEMENT AND SUPPORT

- A. Arrange conduit to maintain head room and present a neat appearance.

3.2 CONDUIT AND WIRE WAYS INSTALLATION

- A. Cut conduit square using a saw or pipe cutter; de-burr cut ends
- B. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- C. Install no more than the equivalent of three 90 degree bends between boxes.
- D. Wipe plastic conduit clean and dry before joining. Apply full even coat of cement to entire area that will be inserted into fitting. Let joint cure for 20 minutes minimum.
- E. Number of conductors per conduit or wire way shall conform to the latest National Electric Code (NEC) requirements.
- F. PVC conduit shall be minimum 36 inches below grade except under vehicular traffic which shall be minimum 48 inches below grade.

END OF SECTION

SECTION 16120
WIRE AND CABLE

PART 1: GENERAL

1.1 WORK INCLUDED

- A. Building wire.
- B. Cable.
- C. Wiring connections and terminations.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

- A. National Electrical Code (NEC). Wiring methods, conductor applications and insulations shall meet the requirements of the NEC.
- B. Standards. Conductors shall conform to IPCEA and NEMA specifications for manufacturing, cable identification and testing and shall be listed and labeled by the Underwriters Laboratories, Inc.

1.3 REFERENCES

- A. NEMA WC 3 - Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- B. NEMA WC 5 - Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

1.4 SHOP DRAWING SUBMITTAL

- A. Submit product data as required.

PART 2: PRODUCTS

2.1 CONDUCTOR MATERIAL, SIZES AND INSULATION

- A. Conductor material shall be copper. Aluminum conductors will not be permitted unless specifically noted on the plans. .

2.2 WIRE AND CABLE 600 VOLTS, NOMINAL OR LESS

- A. Secondary feeders and sub-feeders shall be Type RHW, RUW, THW, THWN, OR XHHW rated 75C, installed in conduit.
- B. Power branch circuits shall be sized as shown on the drawings, and shall be of the following types:
 - 1. Wire #10 gauge and smaller shall be Type UF, where direct buried.
 - 2. Wire larger than #10 shall be Type URD or Type USE-2, where direct-buried.
 - 3. Wire inside building shall be THW or THWN installed in EMT.

2.3 WIRE CONNECTORS

- A. Hand-applied wire connectors for circuit and fixture conductors from No. 8 AWG through No. 14 AWG shall be UL listed for AL/CU, AL/AL and CU/CU, 600 volt insulated, pressure type, 105C, and shall have an integral self-locking spring grip.
- B. Pressure connectors and splices for No. 8 AWG through No. 500 MCM shall be mechanical screw or compression type as follows:
 - 1. Use mechanical connectors for copper conductors only. Connectors shall be copper or bronze bodied, and shall be UL listed configurations for taps, tees or crossover-tees-parallel tap.

2.4 TERMINALS AND SPLICES

- C. Ground connections for No. 1/0 AWG and larger shall be Cadweld or Burndy THERMOWELD, fusible-metal process, or Thomas and Betts COPPERWELD connectors, SERIES 53000.
- D. All terminations in vaults shall use cold-applied splices equal to Raychem GelCap SL or taps splices with kits equal to Raychem CRSM-CT.
- E. Underground tape warning system shall be yellow, color coded, polyethylene tape reading "CAUTION - ELECTRIC LINES BELOW".

PART 3: EXECUTION

3.1 INSTALLATION

- A. Install conductors to conform to the applicable requirements of NEC Article 300, Wiring Methods.

- B. Run all cables continuous from origin to termination without splices unless plans call for splice or tap.
- C. Install separate neutral conductor for all single phase circuits, i.e., no common neutrals.
- D. Install separate grounding conductor in all conduit.
- E. Install separate grounding conductor with all direct-buried cables if cables do not include an equipment ground.
- F. Cable terminals, taps and splices.
 - 1. Pressure-type solderless connectors shall be used, unless otherwise noted or specified.
 - 2. Install compression-type connectors with approved hydraulic tools to assure a permanent, mechanically secure, high-conductivity joint.
- G. Bury underground tape warning system one foot below the surface before final backfilling of trenches.

3.1.1.1 FIELD QUALITY CONTROL

- A. Inspect wire and cable for physical damage and proper connection.
- B. Torque test conductor connections and terminations to manufacturers recommended values.
- C. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

END OF SECTION

SECTION 16450
SECONDARY GROUNDING

PART 1: GENERAL

1.1 WORK INCLUDED

- A. Power system grounding.
- B. Electrical equipment and raceway grounding and bonding.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

- A. Grounding shall comply with Articles 250 and 680 of the NEC, and state and local codes. Grounding electrodes and bonding equipment shall comply with NEMA Standards, and shall be UL listed.

PART 2: PRODUCTS

2.1 GROUNDING CONDUCTORS

- A. Grounding conductors shall be insulated. Insulation type shall be identical with the circuit conductors serving the load. Insulation shall be colored green or green stripe as specified in Specification 16120.

2.2 GROUND ELECTRODES

- A. Ground electrodes shall be copper clad steel, 3/4 inch in diameter, and a minimum of 10 feet long.

2.3 GROUNDING CLAMPS

- A. Grounding clamps shall be UL 467 listed, CSA certified, of copper construction, equal to Burndy GAR3902 series for connection to copper water pipes. For connection to grounding electrodes provide UL 467 listed high copper alloy ground connector equal to Burndy type GRC.

PART 3: EXECUTION

3.1 SYSTEM GROUNDING

- A. Bond the grounding electrode conductors to the neutral service entrance conductor(s) and to the metal frame of the main service entrance equipment.
- B. Bond the grounding electrode conductors to the driven grounding electrodes or as otherwise indicated on contract documents.
- C. Provide a minimum of three ground rods. Provide additional ground rods if required to achieve a service ground of 25 ohms or less.

3.2 GROUNDING CONDUCTORS

- A. Install equipment grounding conductors on all circuits. Run equipment grounding conductors in the same raceway as the circuit conductors serving each load.

END OF SECTION

SECTION 16470

PANELBOARDS

PART 1: GENERAL

1.1 WORK INCLUDED

- A. Service and distribution panelboards.
- B. Lighting and appliance branch circuit panelboards.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

- A. Panelboards shall comply with NEMA Standards, shall be UL listed, and shall have an Integrated Equipment Rating.

1.3 SHOP DRAWING SUBMITTALS

- A. Submit shop drawings for equipment and component devices as required.
- B. Submit dimensioned drawings of installed panelboards and enclosures showing accurately scaled layout of enclosures and required individual panelboard devices, including but not necessarily limited to circuit breakers and accessories. Submit manufacturers literature on enclosures, bussing, fronts, surge arrestors, etc.

PART 2: PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Square D
- B. General Electric
- C. Cutler-Hammer
- D. ITE/Siemen-Allis

2.2 MAIN DISTRIBUTION PANELBOARDS

- A. Panelboards: NEMA PB 1; circuit breaker type.

- B. Enclosure: NEMA PB 1; Type 1.
- C. Provide cabinet front with screw cover, and hinged door with flush lock. All panelboard doors to open 180 degrees. Finish in manufacturers standard gray enamel.
- D. Provide panelboards with copper bus, ratings as scheduled on Panel Schedule on contract drawings. Provide copper ground bus in all panelboards.
- E. Minimum integrated short circuit rating: 10,000 amperes RMS symmetrical for 240 Volt panelboards. Refer to panel schedules for required A.I.C.
- F. All panelboards shall be of the dead-front safety type equipped with thermal-magnetic circuit breaker branches.
- G. Provide bonded grounding lug.
- H. Provide integral transient voltage surge suppression (TVSS) device with 100 kA surge current rating at 240 VAC. TVSS shall bolt onto panel bus in same fashion as circuit breaker. Device shall be equal to Square-D SurgeLogic.

2.3 BRANCH CIRCUIT PANELBOARDS

- A. Lighting and appliance branch circuit panelboards: NEMA PB 1 ; circuit breaker type, FS W-P-115; Type I, Class 1.
- B. Enclosure: NEMA PB 1 ; Type 1.
- C. Cabinet size: 6 inches deep; 20 inches wide for 240 Volt and less panelboards, 20 inches for 480 Volt panelboards.
- D. Provide cabinet front with concealed trim clamps, concealed hinge and flush lock all keyed alike. All panelboard doors to open 180 degrees. Finish in manufacturers standard gray enamel. See panel schedule on contract drawings for surface or flush mounting requirements.
- E. Provide panelboards with copper bus, ratings as scheduled on the Panel Schedule on the contract drawings. Provide copper ground bus in all panelboards.
- F. Minimum integrated short circuit rating: 10,000 amperes RMS symmetrical for 208 Volt panelboards. Refer to panel schedules for required A.I.C.
- G. Molded case circuit breakers: NEMA AB 1, FS W-C-375; bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles.
- H. All panelboards shall be of the dead-front safety type equipped with thermal magnetic circuit breaker branches.
- I. Provide equipment grounding bar in all panelboards.

PART 3: EXECUTION

3.1 INSTALLATION

- A. Install panelboards plumb, in conformance with NEMA PB 1.1.
- B. Height: 5 feet - 6 inches to handle of highest circuit breaker.
- C. Provide filler plates for unused spaces in panelboards.
- D. Provide typed circuit directory for each branch circuit panelboard. Directory shall consist of a metal frame, clear plastic cover and directory.
- E. Provide plastic laminated nameplates attached to front of panelboard door showing panel designation and voltage, black letters on white background:

EXAMPLE: PANEL HL

100A 480Y/277V 3P 4W

- F. All panelboards shall be keyed alike. Furnish each panelboard with two keys for each lock.
- G. All panelboards provided for this project shall be the product of one manufacturer.

3.2 FIELD QUALITY CONTROL

- A. Visual and mechanical inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for main feeders, circuit breakers, fusible switches and fuses.

3.3 PANELBOARD SCHEDULE

- A. See PANEL SCHEDULES on contract drawings.

END OF SECTION